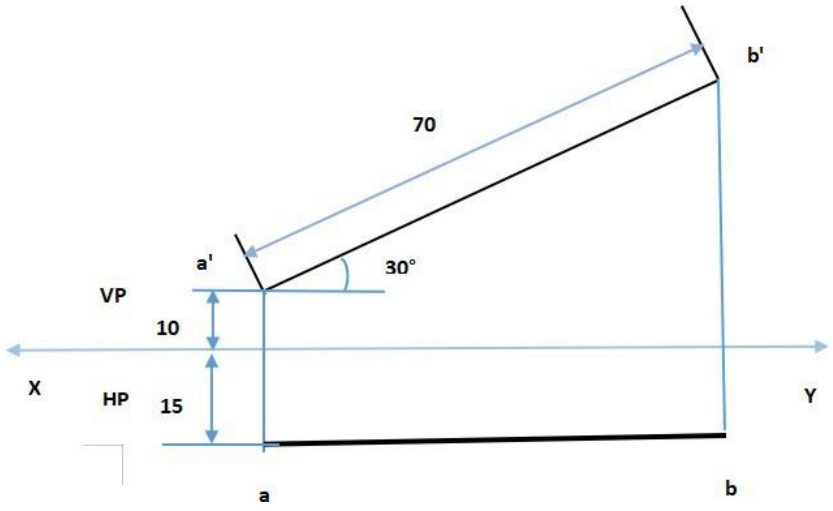
ENGINEERING GRAPHICS

UNIT-I

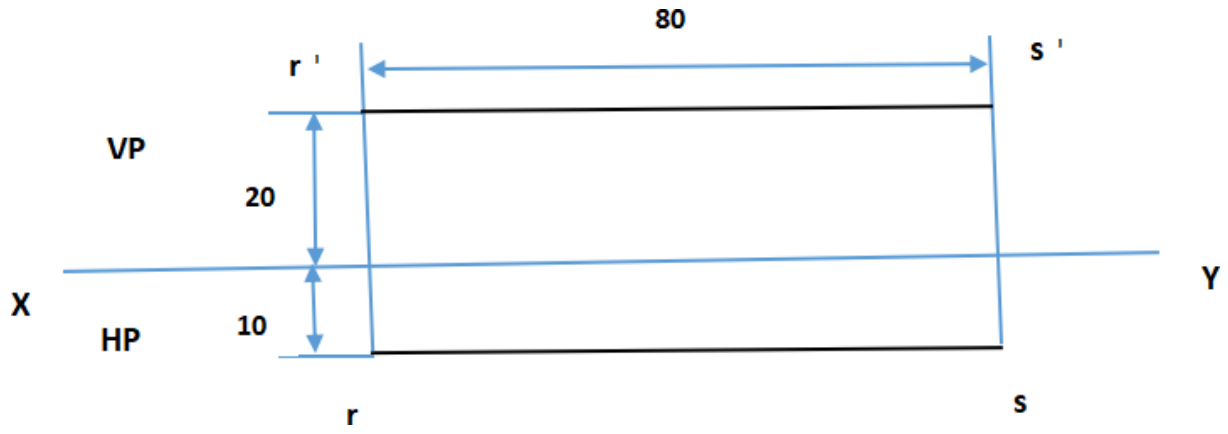
POINTS, LINES & PLANES

PART-B

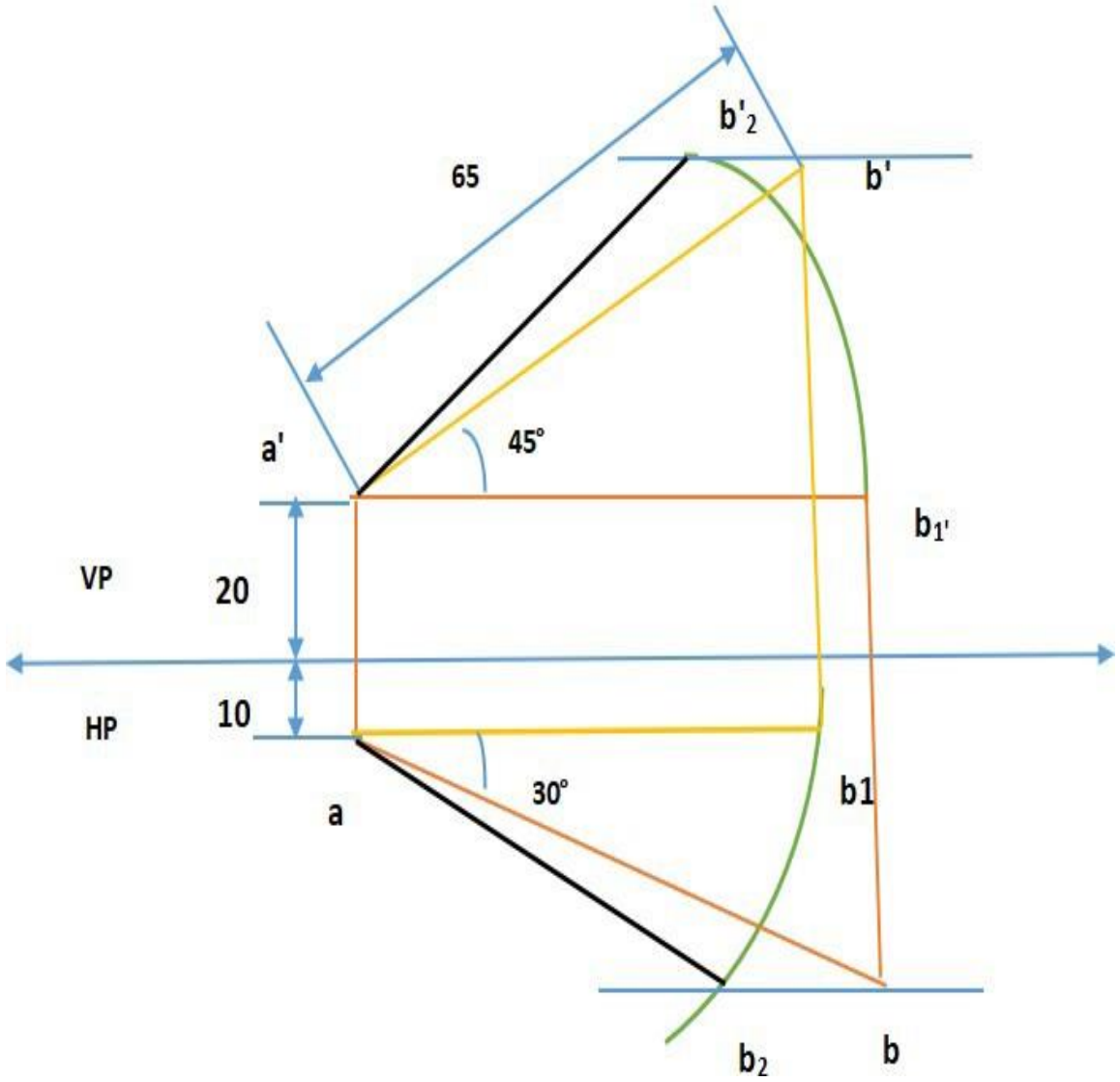
1. A line PQ 70mm long is located 10mm above HP and 15mm infront of VP, Line PQ is inclined 30 to HP and parallel to VP. Draw the projection of front and top view of line.



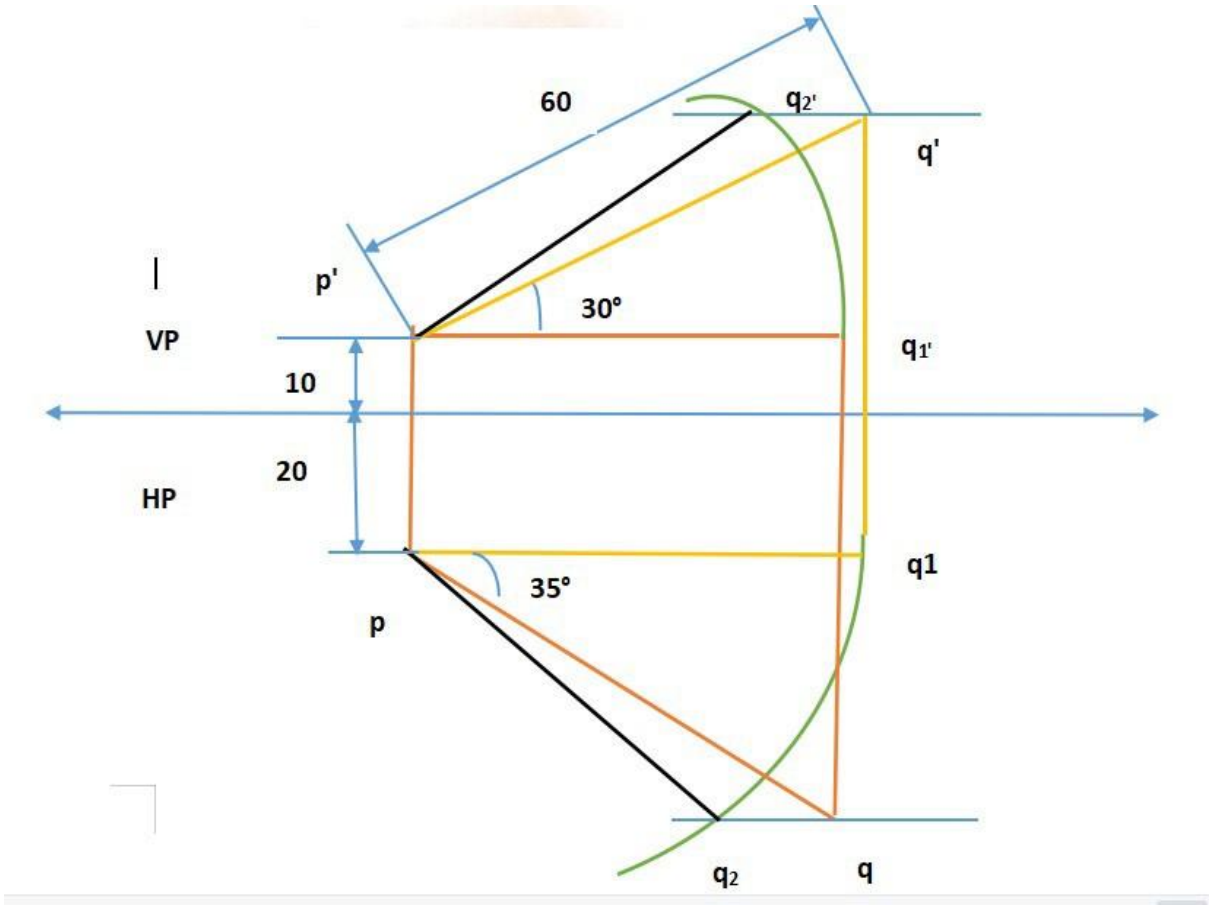
2. A line RS 80mm long is located 20mm above HP and 10mm infront of VP, Line RS is parallel to HP and VP. Draw the projection of front and top view of line.



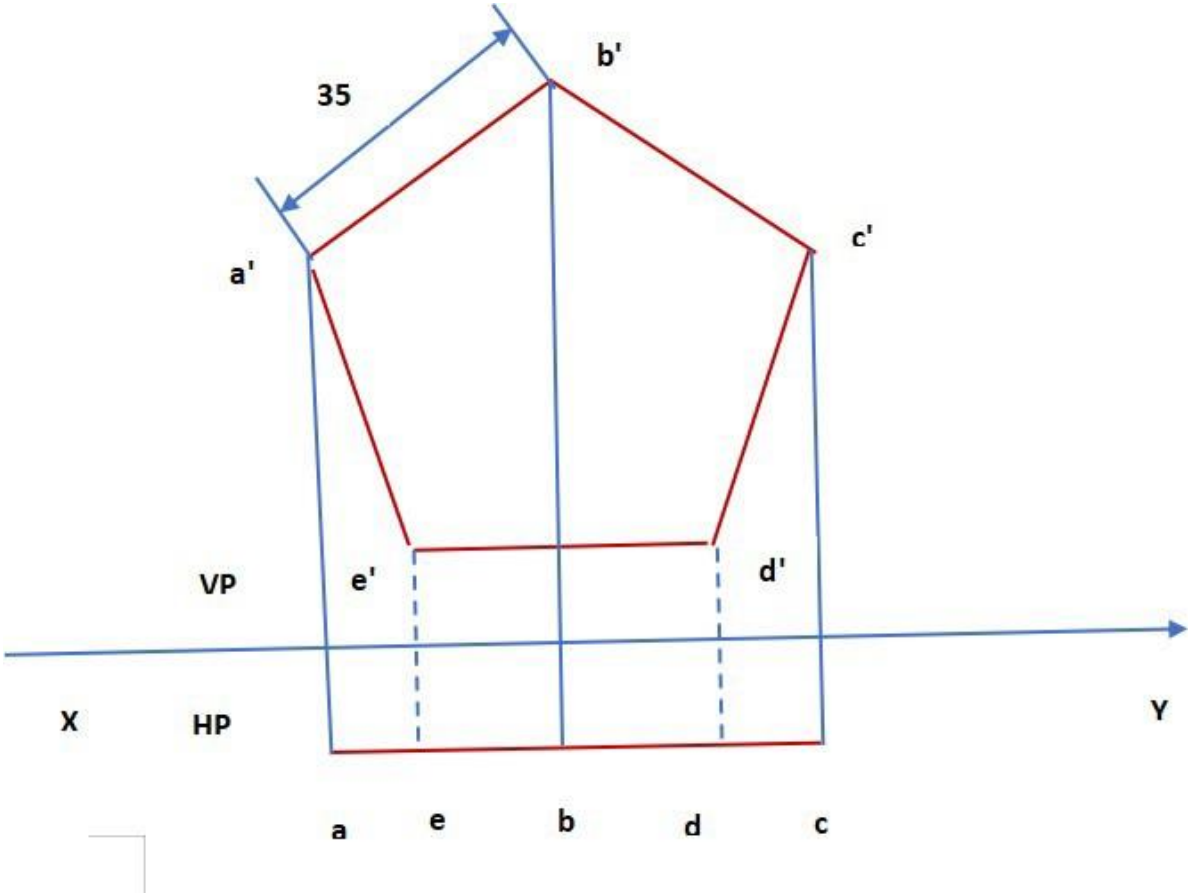
3. A line AB 65mm long, it is located 20mm above HP and 10mm infront of VP. Line AB is inclined 40 to HP and 30 inclined to VP. Draw the projection of of line front and top view and find the true inclination.



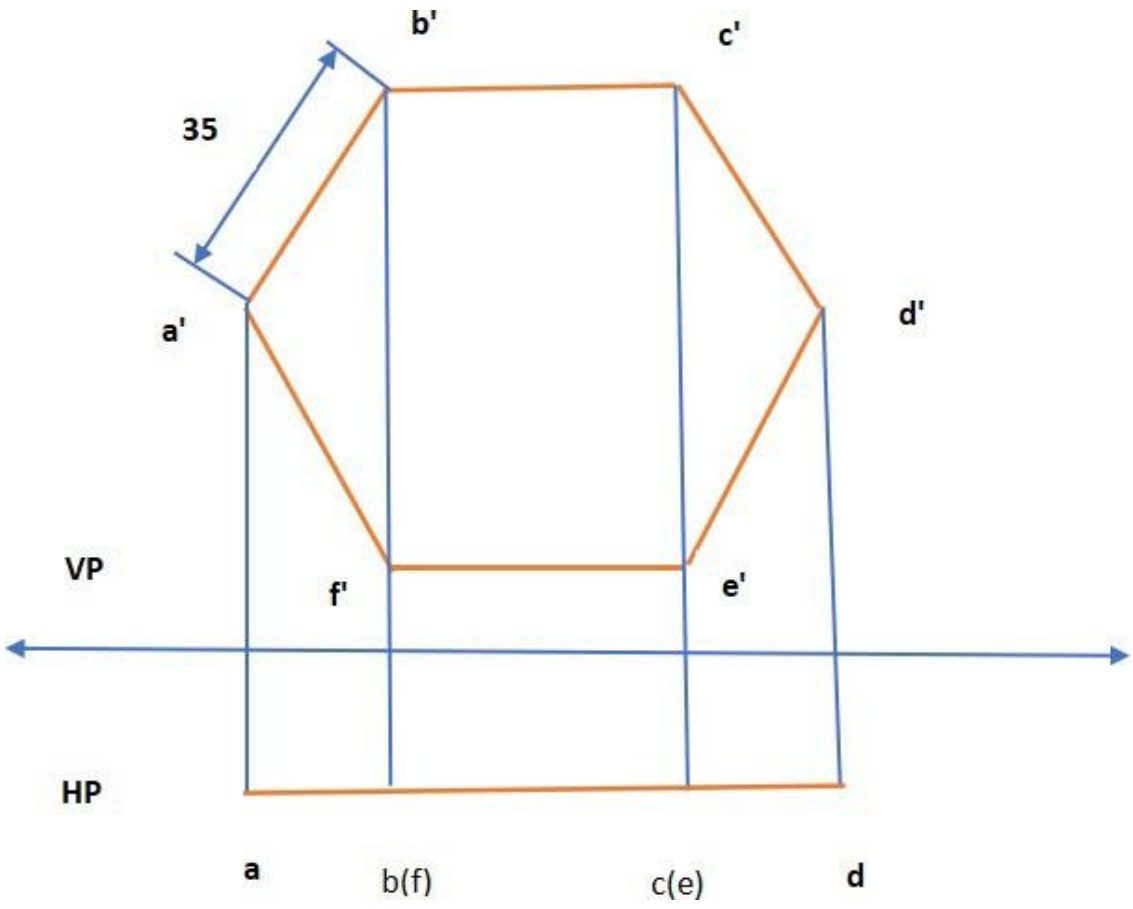
4. A line PQ 60mm long, it is located 10mm above HP and 20mm infront of VP. Line PQ is inclined 30 to HP and 35 inclined to VP. Draw the projectionof line front and top view and find the true inclination.



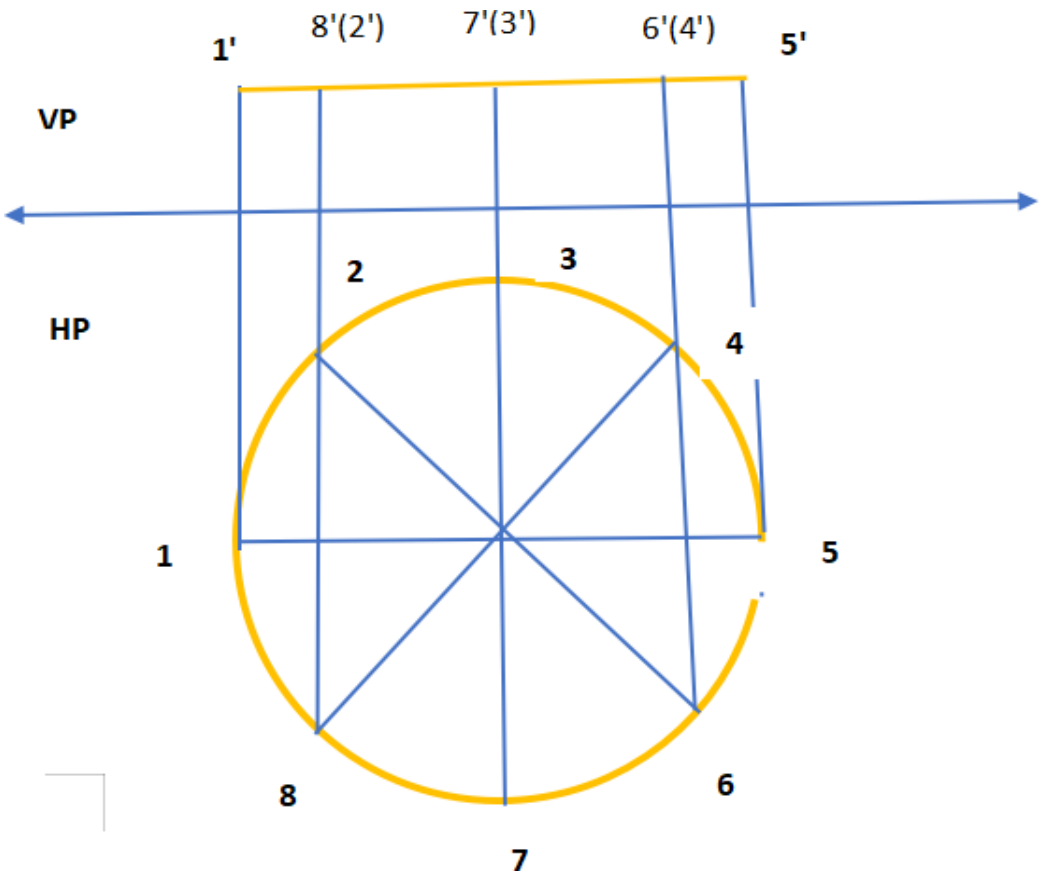
5. A Pentagon plane sides 35mm. The plane is parallel to HP and Perpendicular to VP. Draw the projection of plane front view and top view.



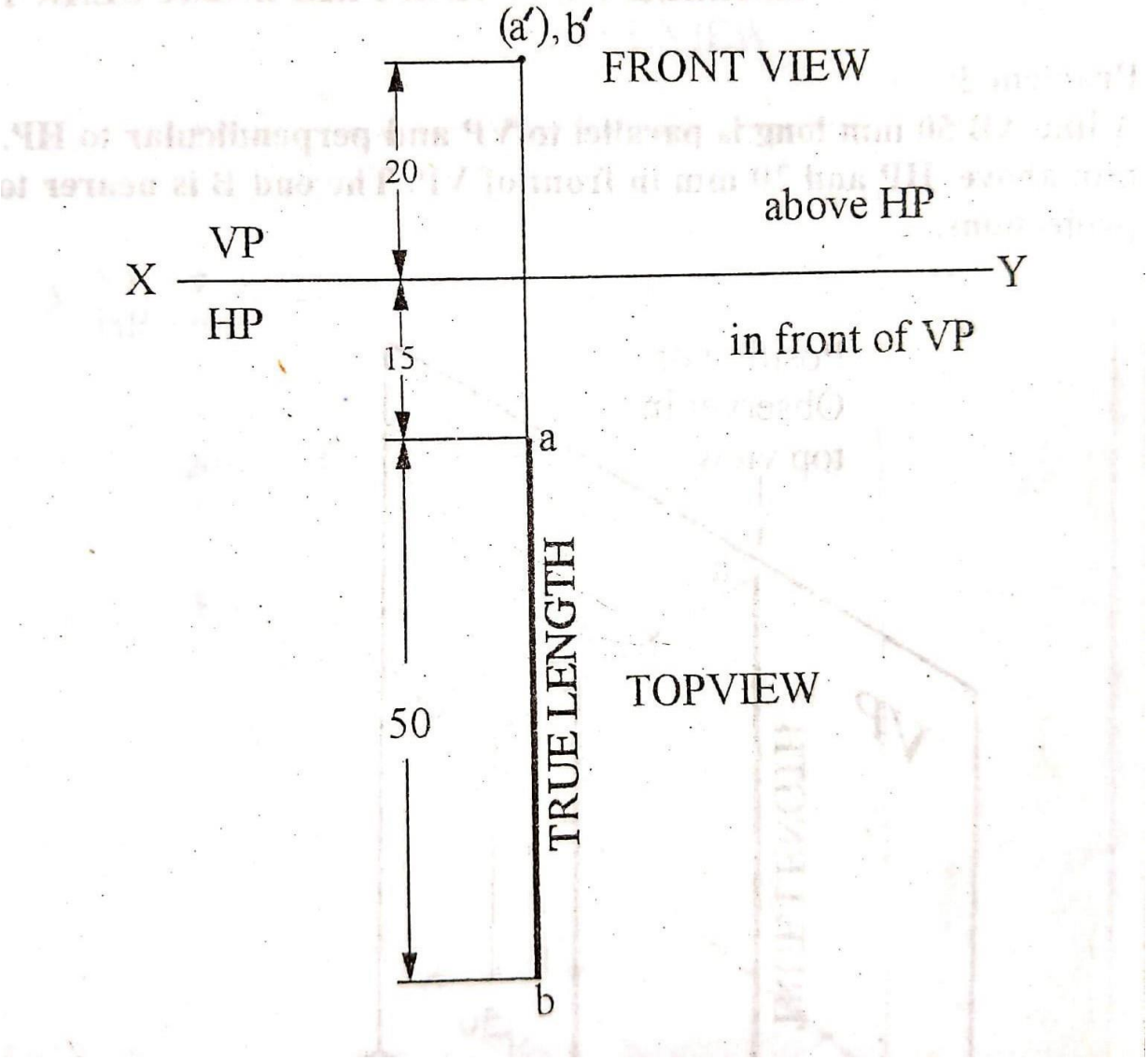
6. A Hexagon plane sides 35mm. The plane is parallel to VP and Perpendicular to HP. Draw the projection of plane front view and top view.



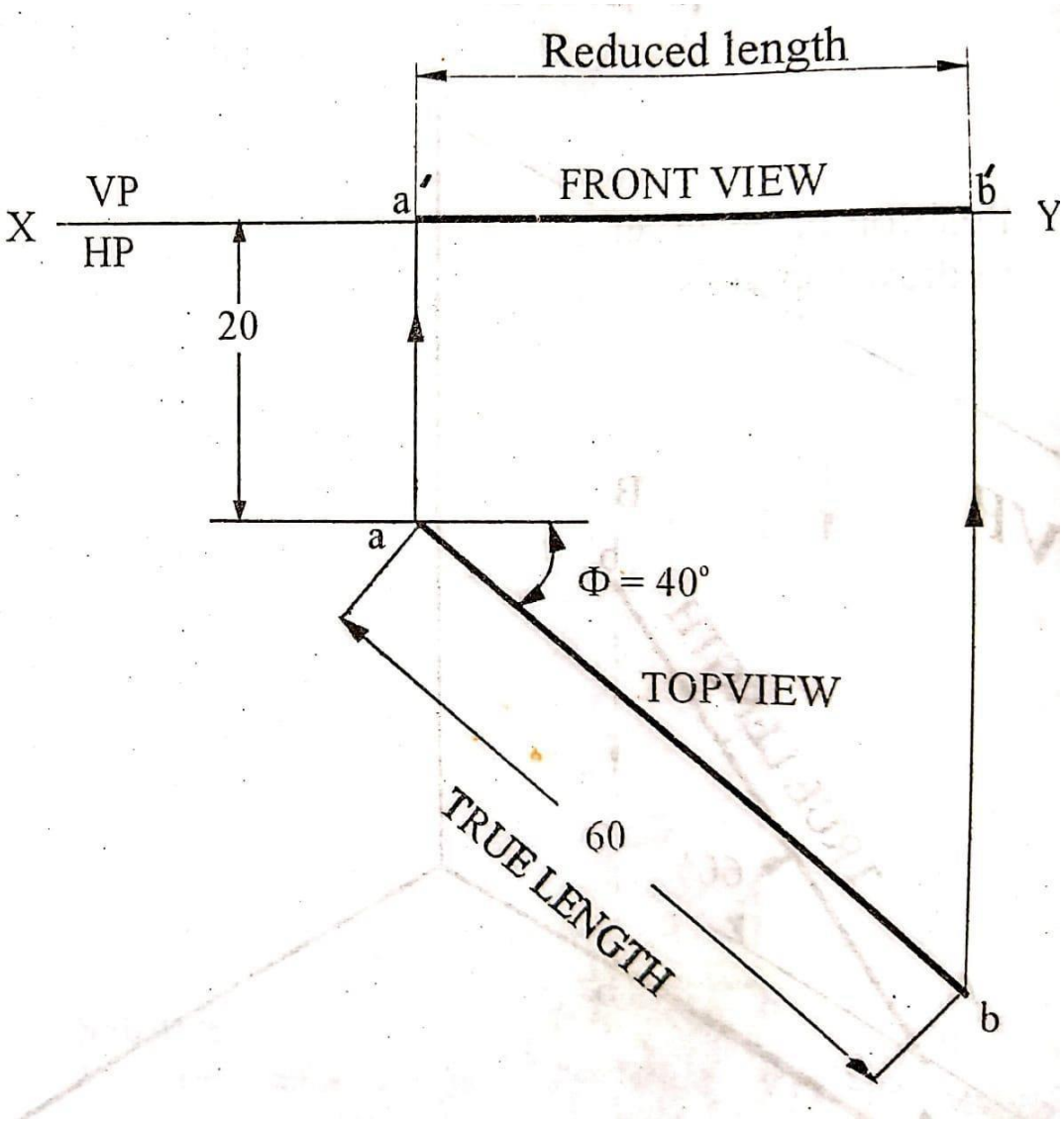
7. A Circular lamina 30mm diameter, lamina is parallel to HP and Perpendicular to VP. Draw the projection of plane front view and top view.



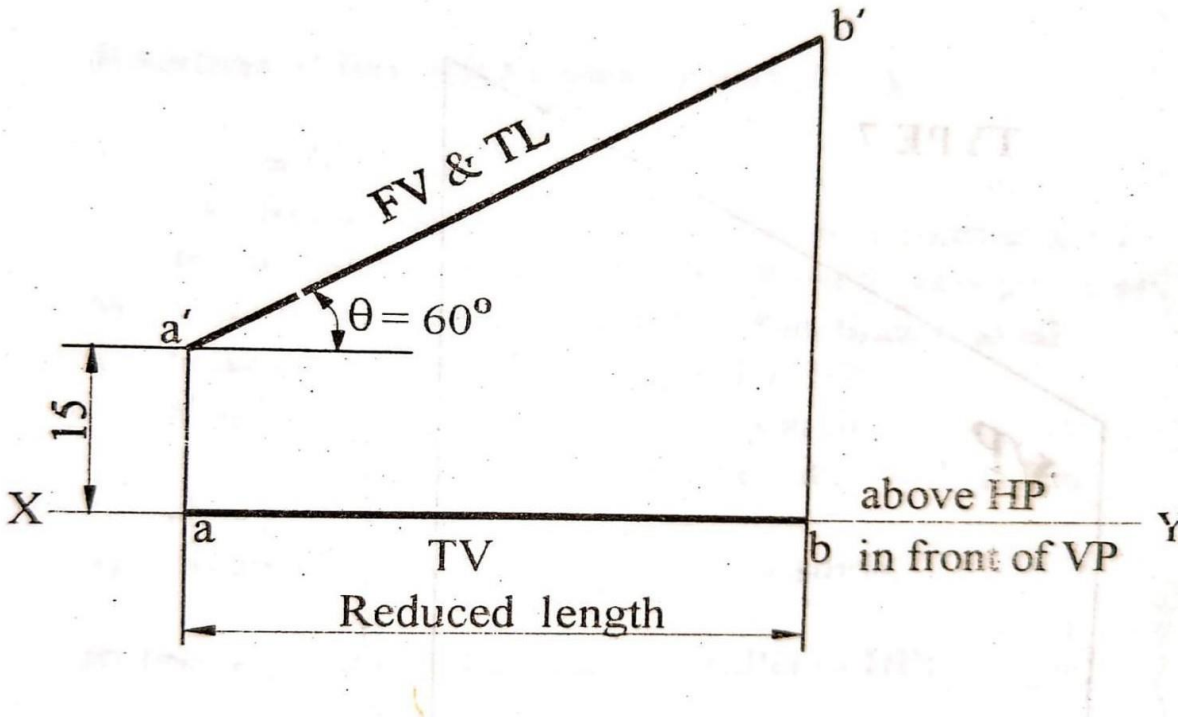
8. A line AB 50mm long is parallel to HP and perpendicularto VP. One end A of the line is 15mm in front of VP and 20mm above HP. Draw the projections.



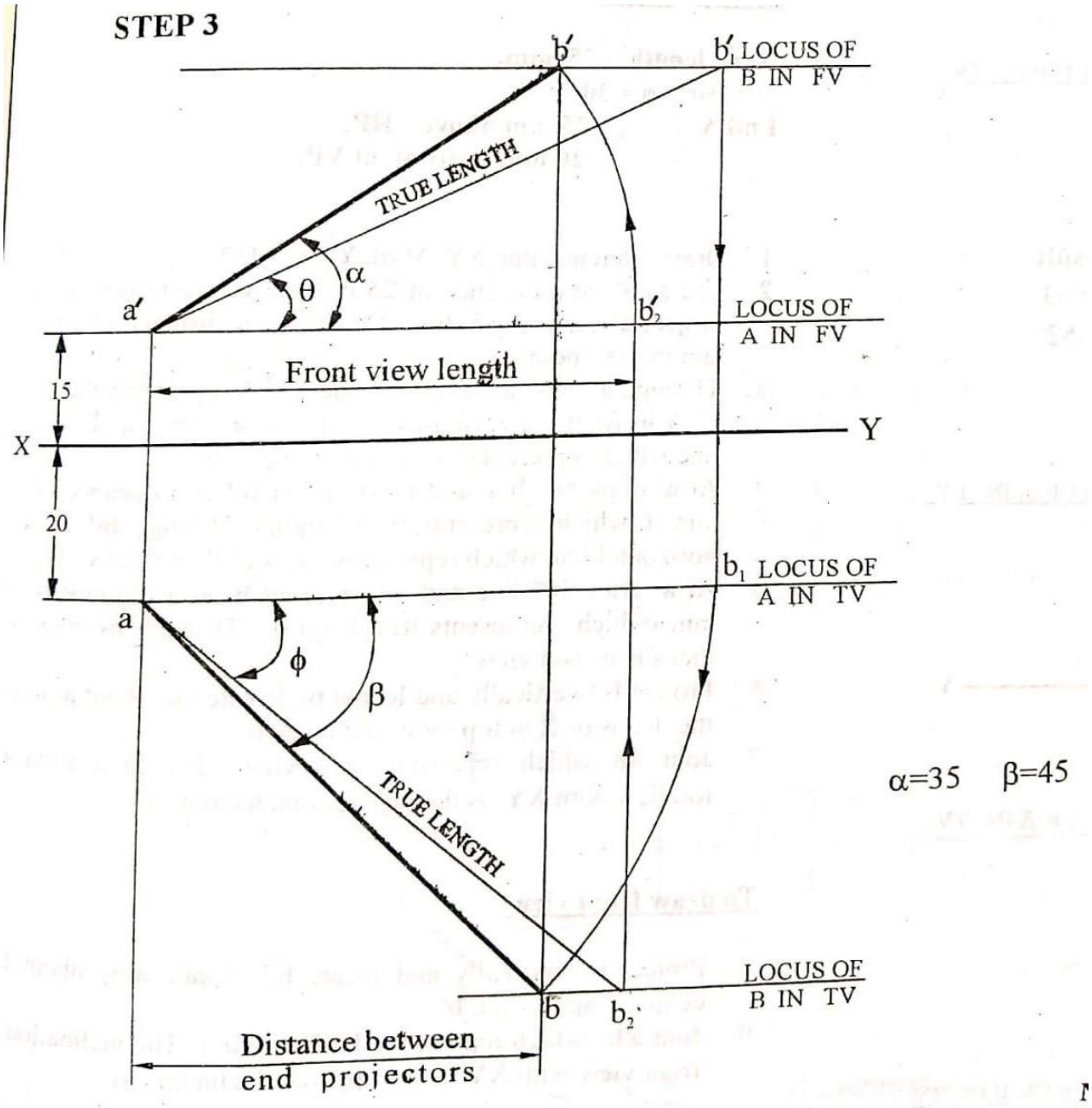
9. A line AB 60mm long is parallel to HP and inclined 40° to VP. The point A is 15mm above HP 20mm in front of VP. Draw the projections.



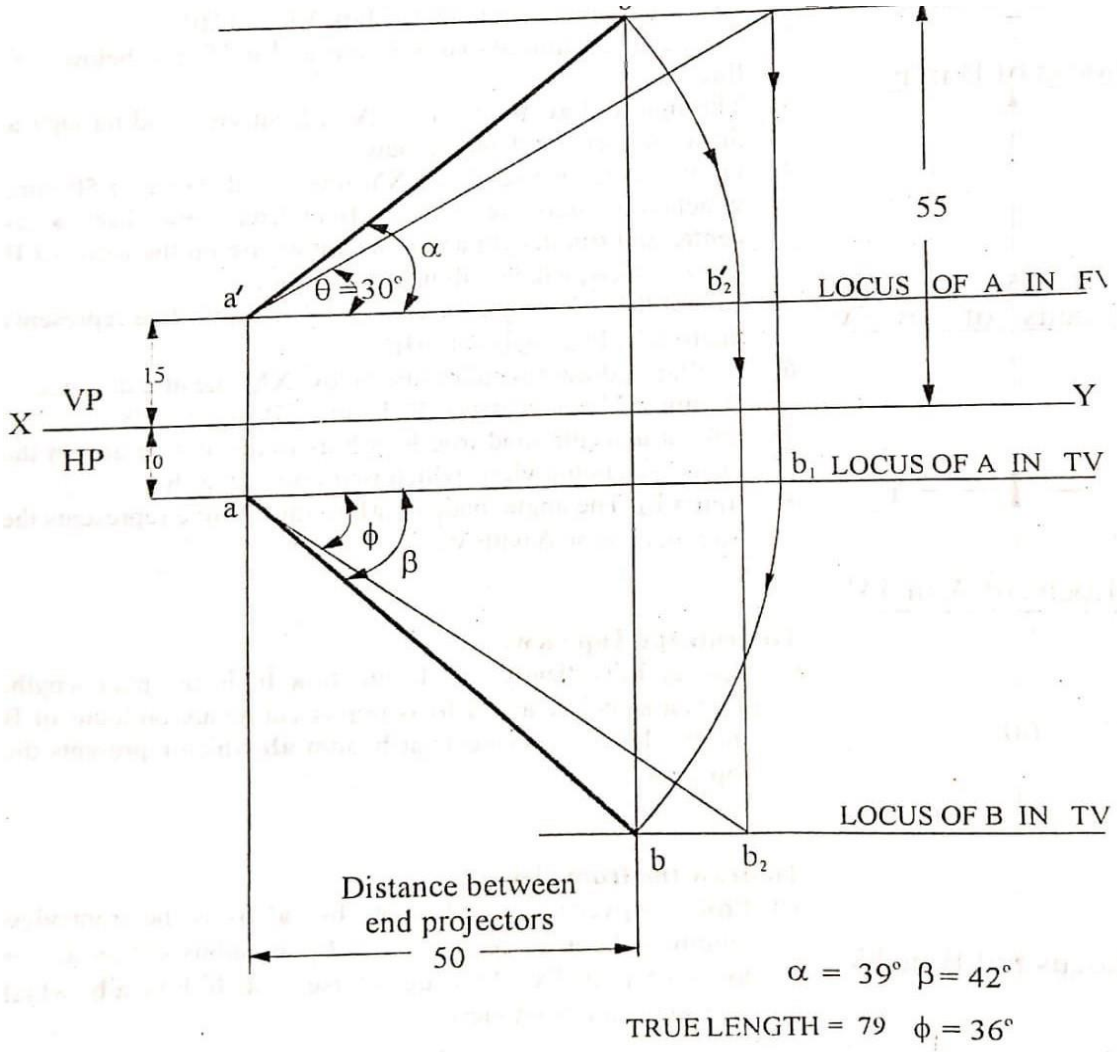
10. A line AB 60mm long is lying on VP and inclined 60° to HP. Thepoint A is 15mm above HP. Draw the projections.



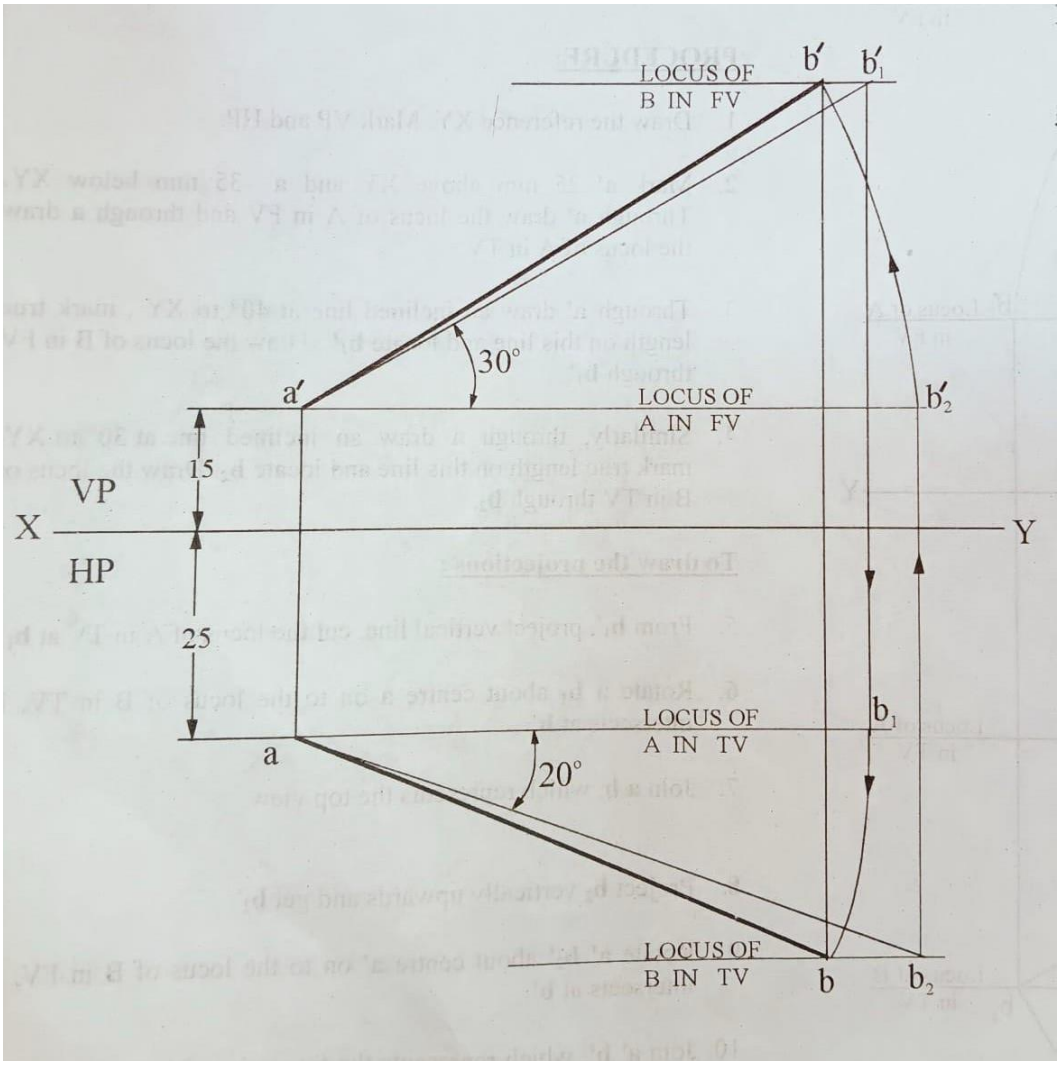
11. A line AB 80mm long, inclined at 25 to HP and 40 to VP. The end A is 20mm in front of VP and 15mm above HP. Draw the projections.



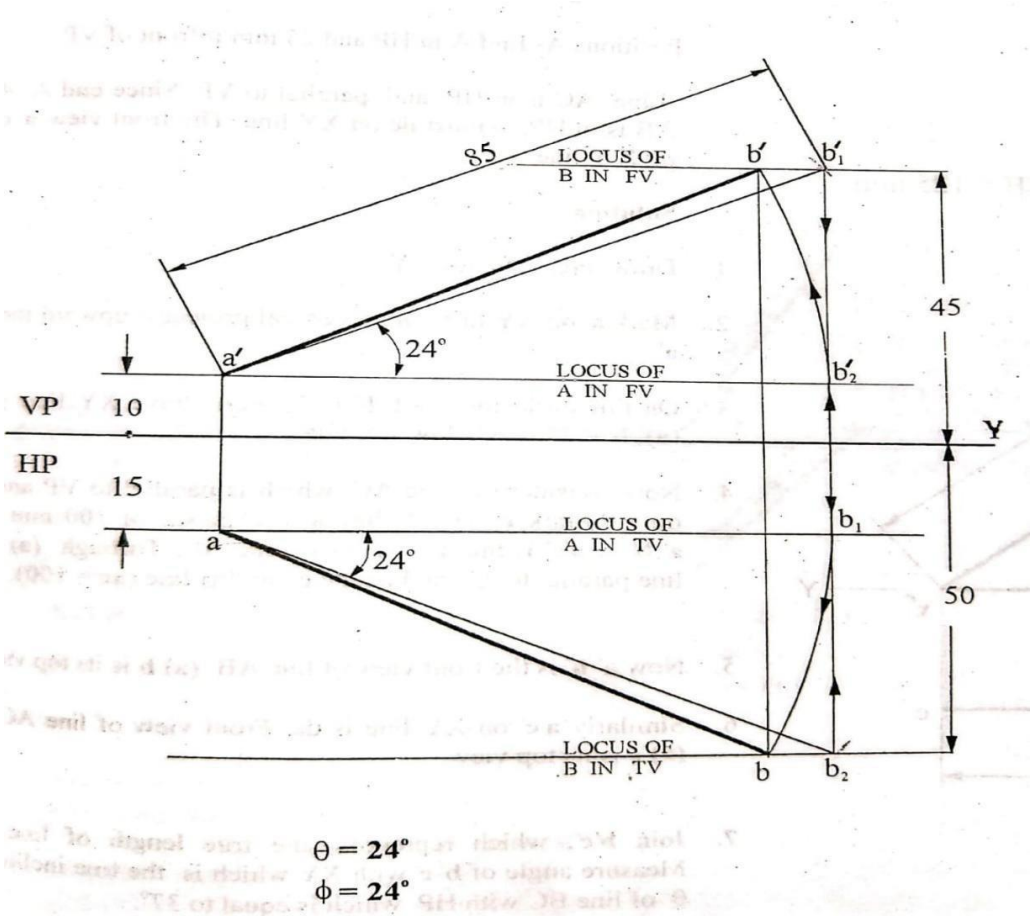
12. A line AB 80mm long has its end A 15mm above HP and 10mm in front of VP. The end B is 55mm above HP and the line is inclined to 30° to HP and 39° to VP. Draw the projection of the line.



13. A line AB 80mm long is making as an angle of 30° to with HP and 20° with VP. The line is such that its lower most A is 15mm above the HP and 25mm in front of VP with the line in the first quadrant. Draw the projections of the line AB.

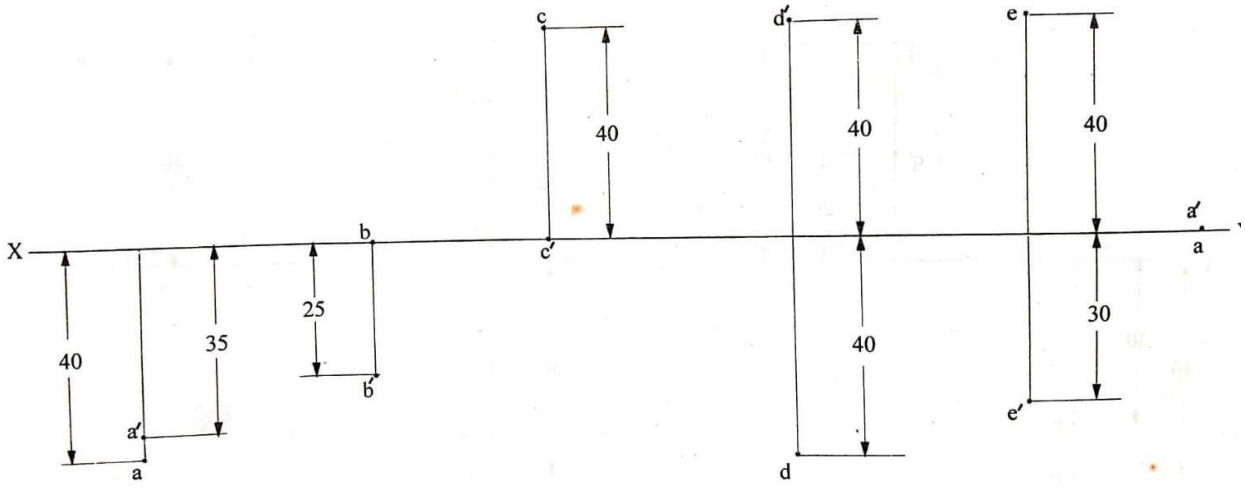


14. A line AB 85mm long is making as an angle of 24° to with HP and 24° with VP. The line is such that its lower most A is 10mm above the HP and 15mm infront of VP with the line in the first quadrant. Draw the projections of the line AB.



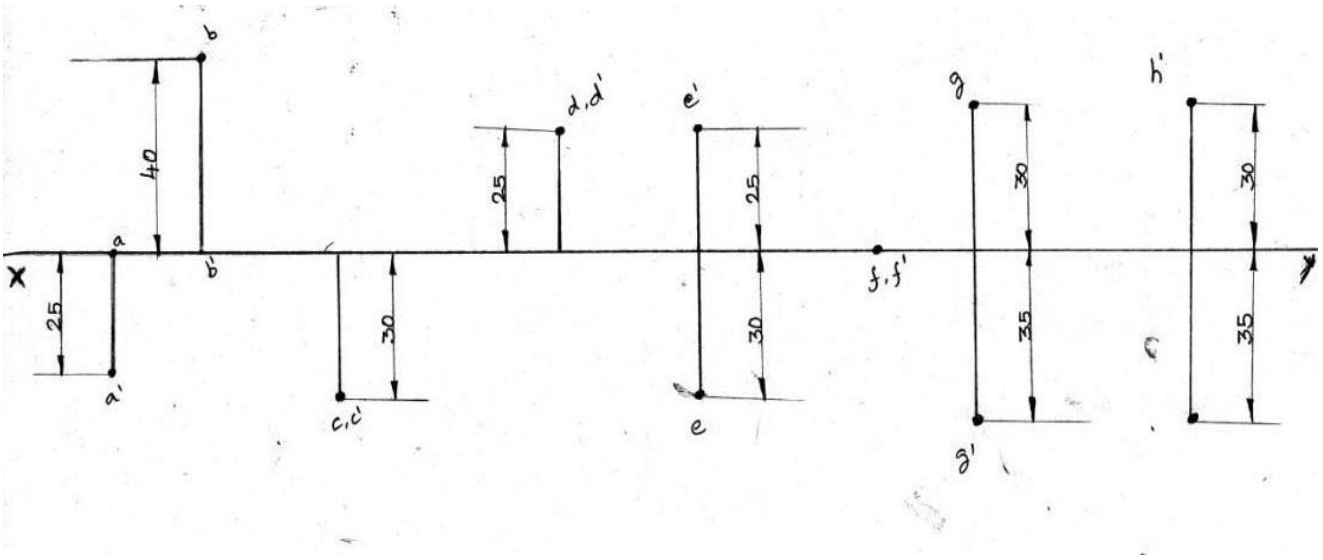
15. POINTS

1. Point A is 35mm below the HP, 40mm in front of VP.
2. Point B 25mm below HP, on the VP.
3. Point C 40mm behind VP, on the HP.
4. Point D 40mm in front of VP, 40mm above the HP.
5. Point E 0mm below HP, 30mm behind VP.
6. The point lies on the intersection of both HP and VP.

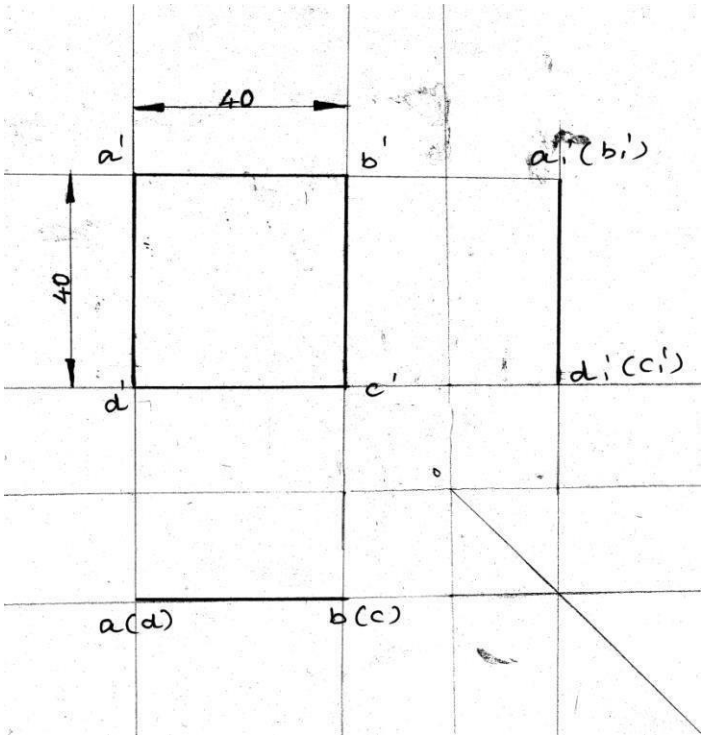


16. Draw the projections of point in common reference line

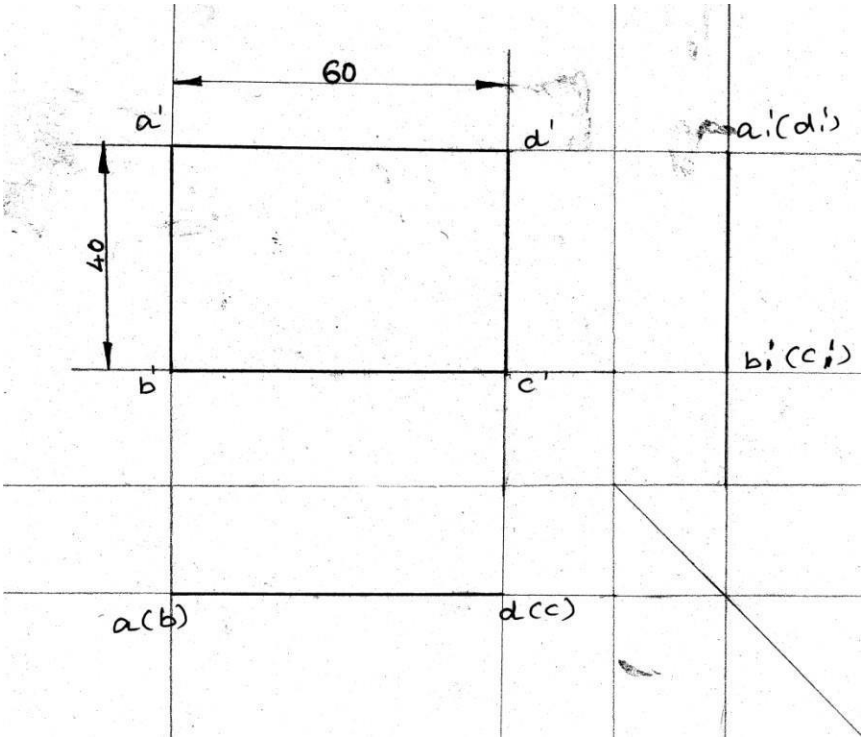
1. 25mm below HP & in VP.
2. 40mm behind of VP & in HP.
3. 30mm below HP & 30mm in front of VP.
4. 25mm above HP & 25mm behind of VP.
5. 25mm above HP & 30mm in front of VP.
6. In both HP & VP
7. 35mm below HP & 30mm behind of VP.
8. 30mm above HP & 35mm behind of VP.



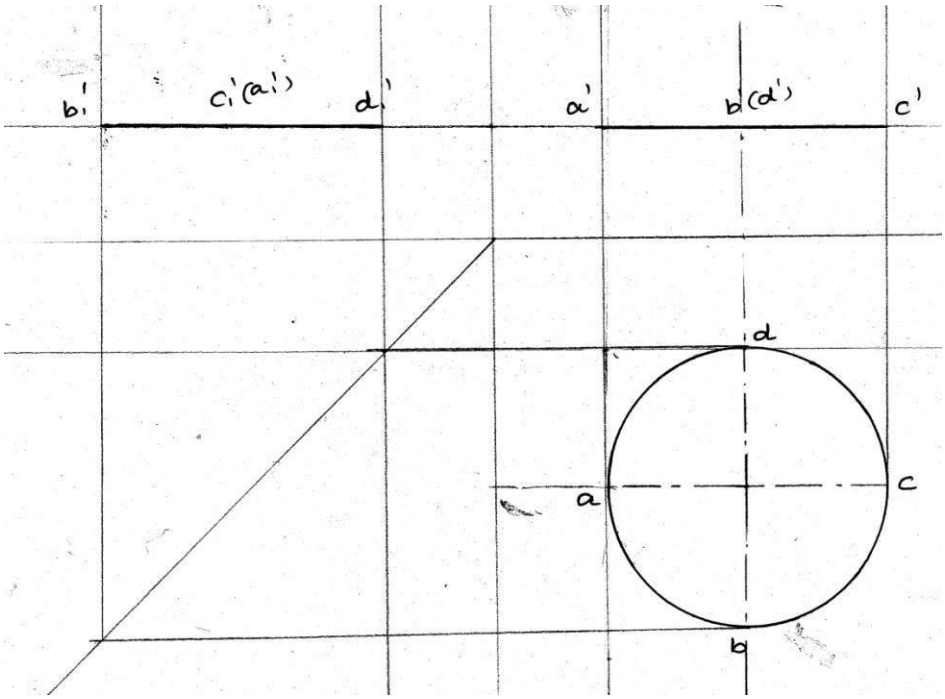
17. A square lamina 40mmx40mm perpendicular to HP and parallel to VP.Draw its projection of a plane surfaces.



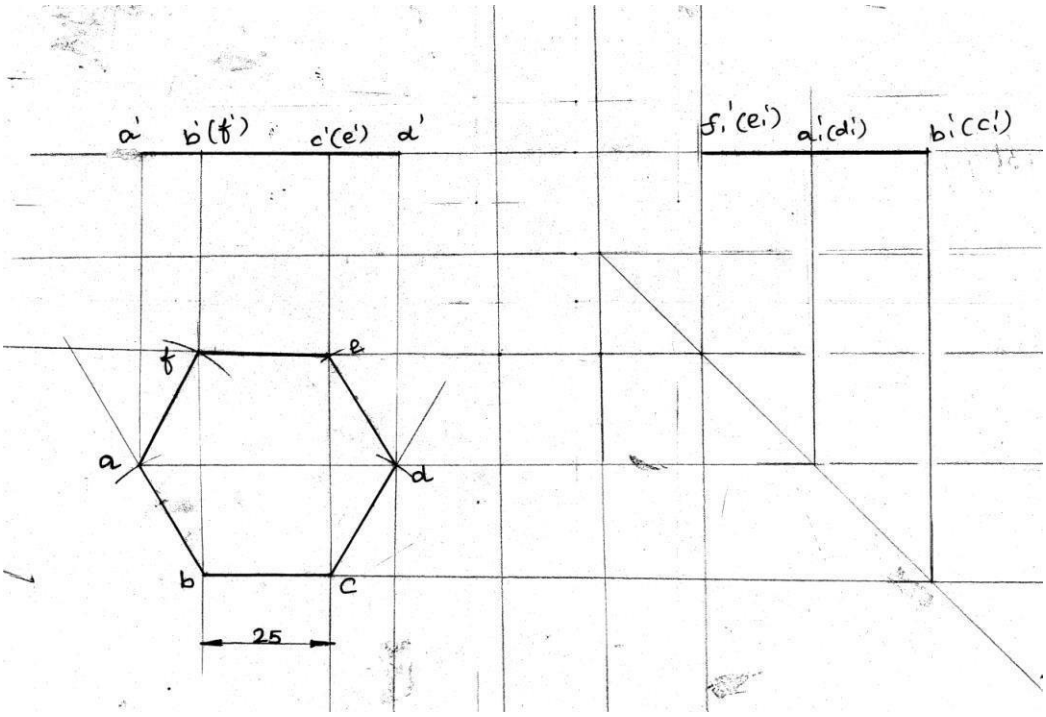
18. A rectangular lamina 60mmx40mm perpendicular to HP and parallelto VP. Draw its projection of a plane surfaces.



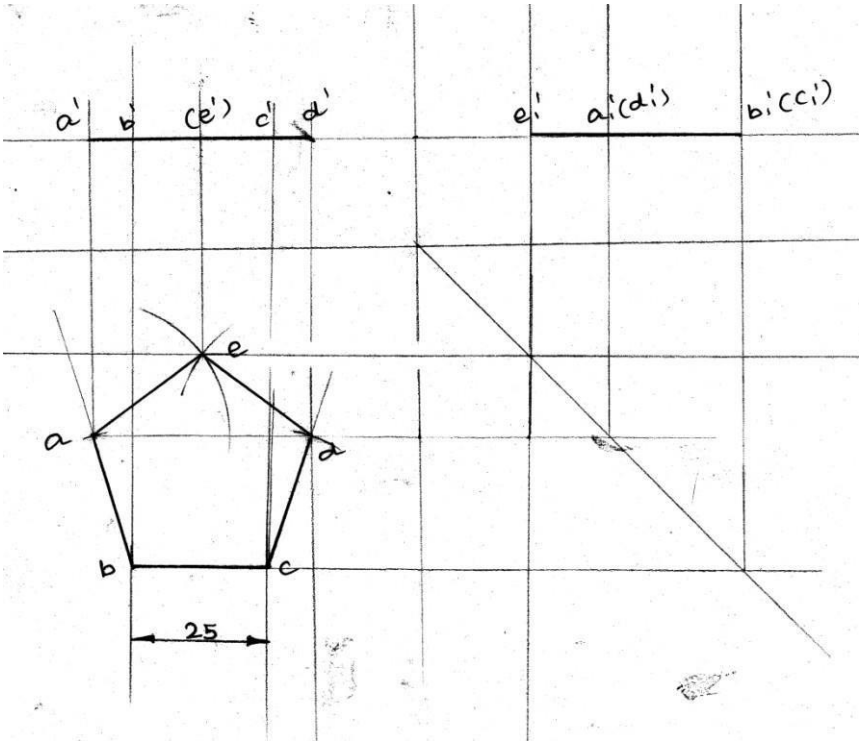
19. A circular lamina diameter is 50mm perpendicular to VP and parallel toHP. Draw its projection of a plane surfaces &right side view.



20. A hexagon lamina sides 25mm perpendicular to VP and parallel toHP. Draw its projection of a plane surfaces & left side view.



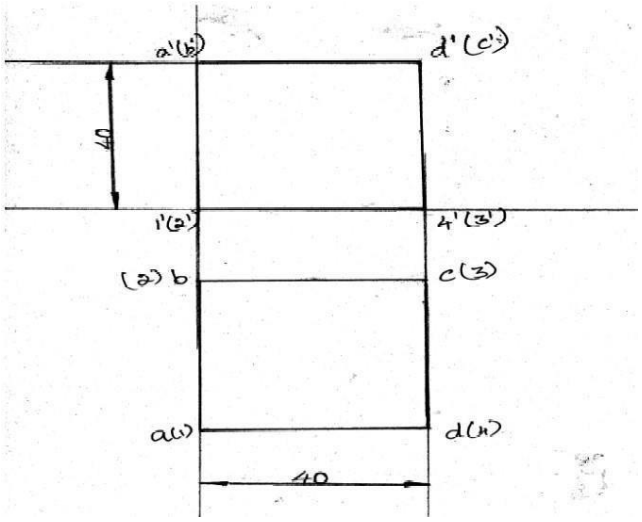
21. A pentagon lamina sides 25mm perpendicular to VP and parallel to HP.Draw its projection of a plane surfaces & left side view.



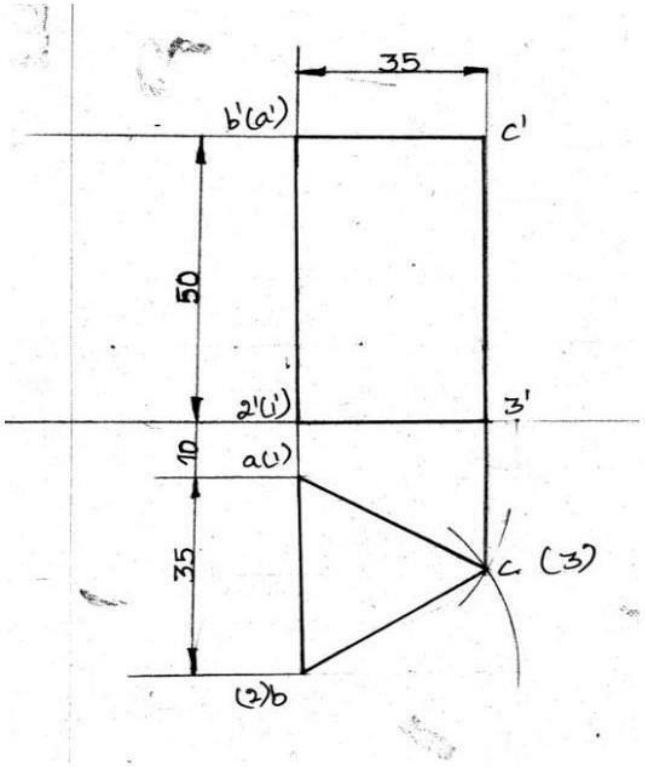
UNIT -2

PROJECTION OF SOLIDS

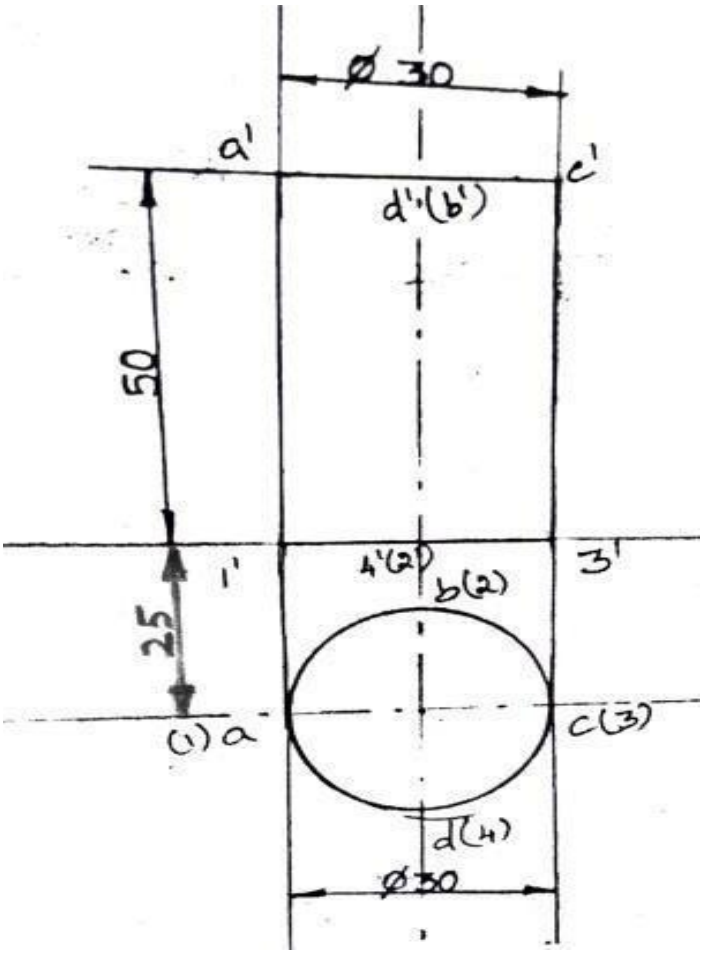
1. Draw the top view and front view of a cube of 40mm side resting withone of its square faces on HP.



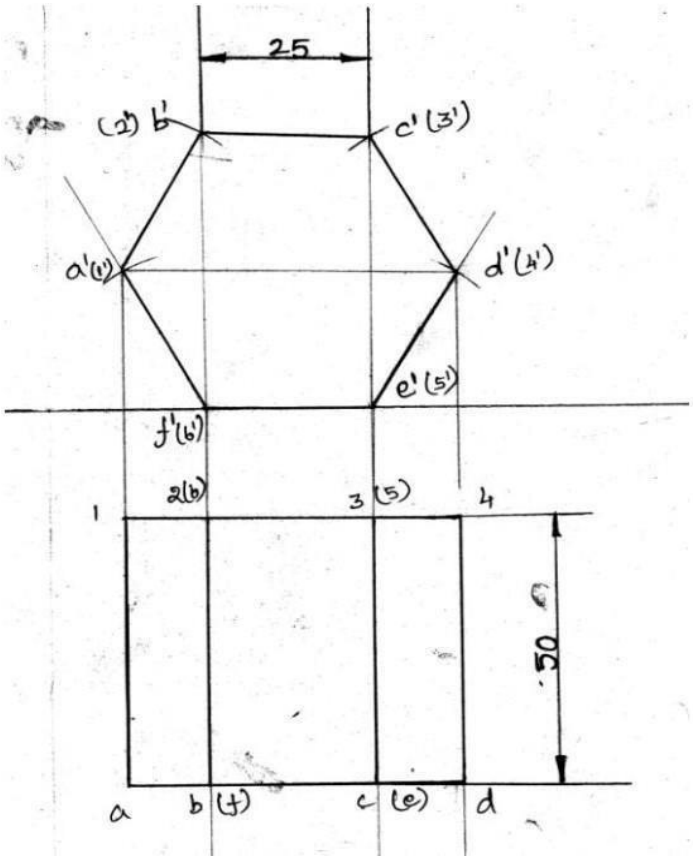
2. A triangular prism of base side 35mm & height 50mm rests with its base on HP such that oneof its rectangular faces is perpendicular to VP and its shorter edge is 10mm in front of VP. Draw its front view and top view.



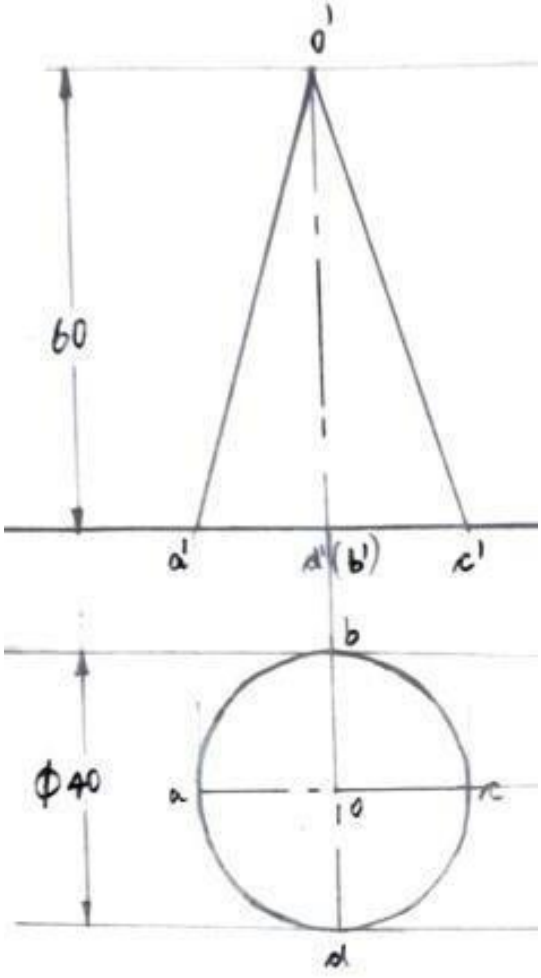
3. Draw the projections of a cylinder of base 30mm diameter and axis50mm long resting with its base on HP and axis 25mm in front of VP.



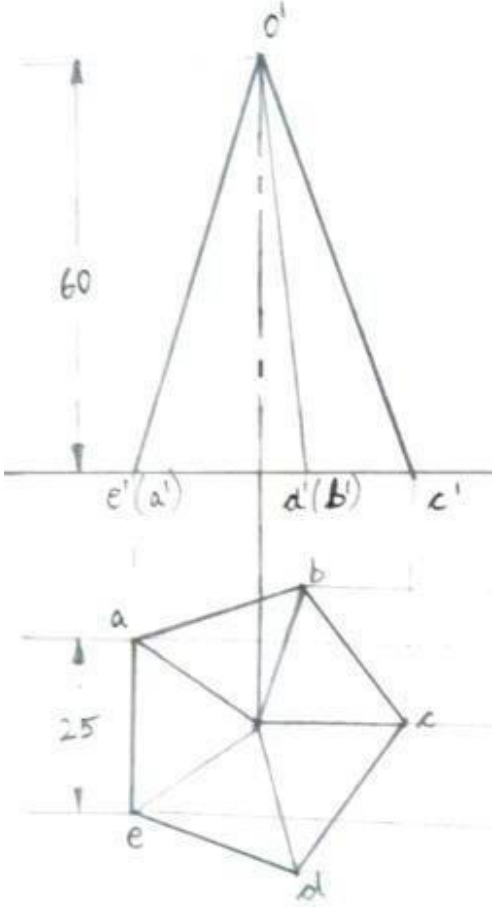
4. A hexagonal prism side of base 25mm and axis 50mm long,lies with one of its rectangular faces on HP such that axis is perpendicular to VP. Draw its front view and top view.



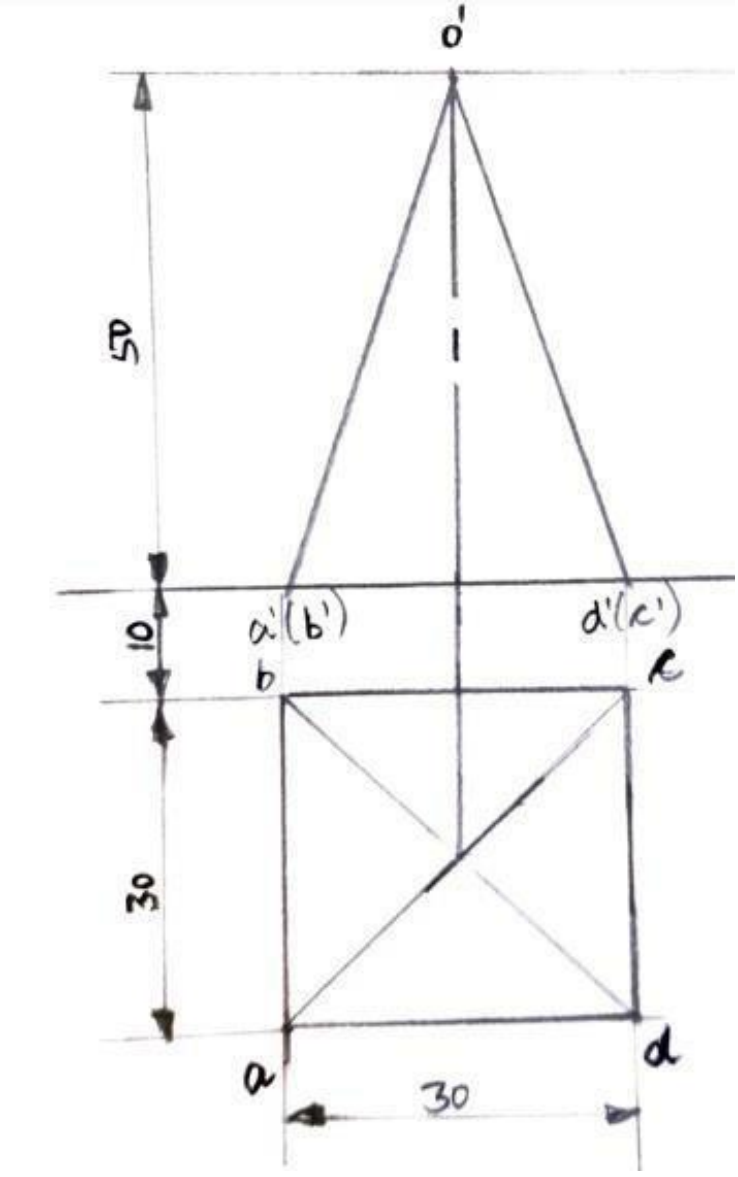
5. A right circular cone of base 40mm dia & ht 60mm is resting withits base on HP. Draw the top view & front view of the cone.



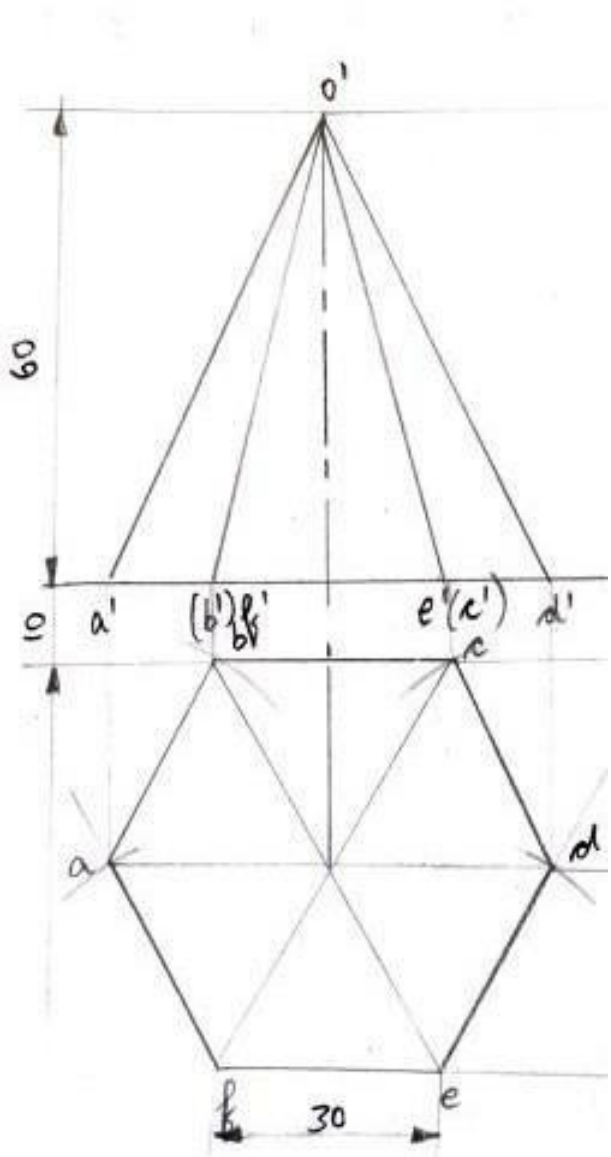
6. A Pentagonal pyramid of side 25mm & height 60mm rest with its base on HP such that one of the edges of the base is perpendicular to VP. Draw the top view and front view of the pyramid.



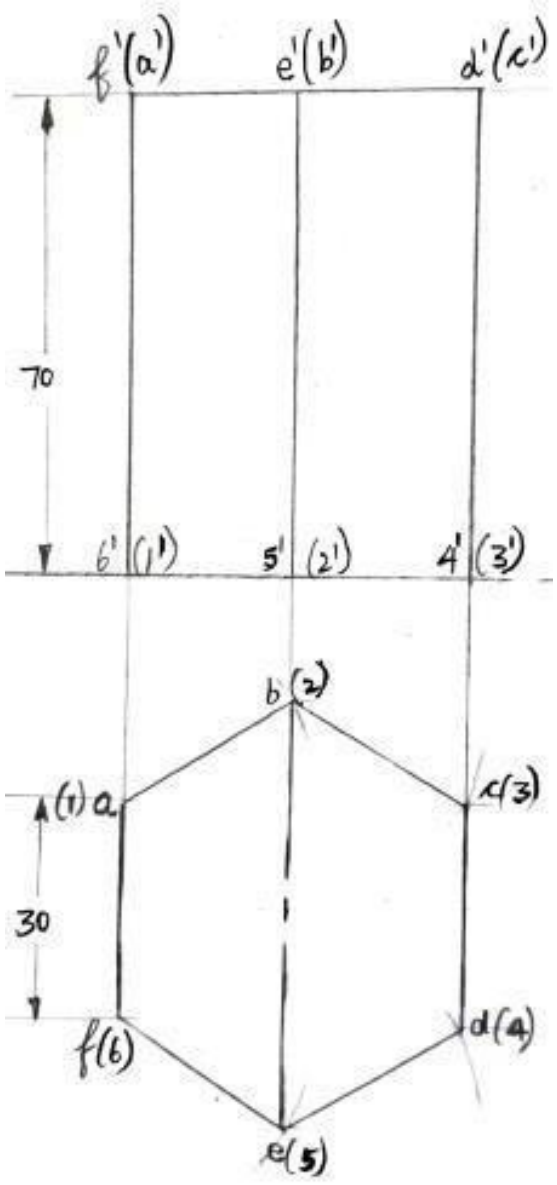
7. A square pyramid, side of base 30mm & axis 50mm long rest with its base on HP, such that one of its two adjacent base edges perpendicular to VP and 10mm in front of VP. Draw its top, front view.



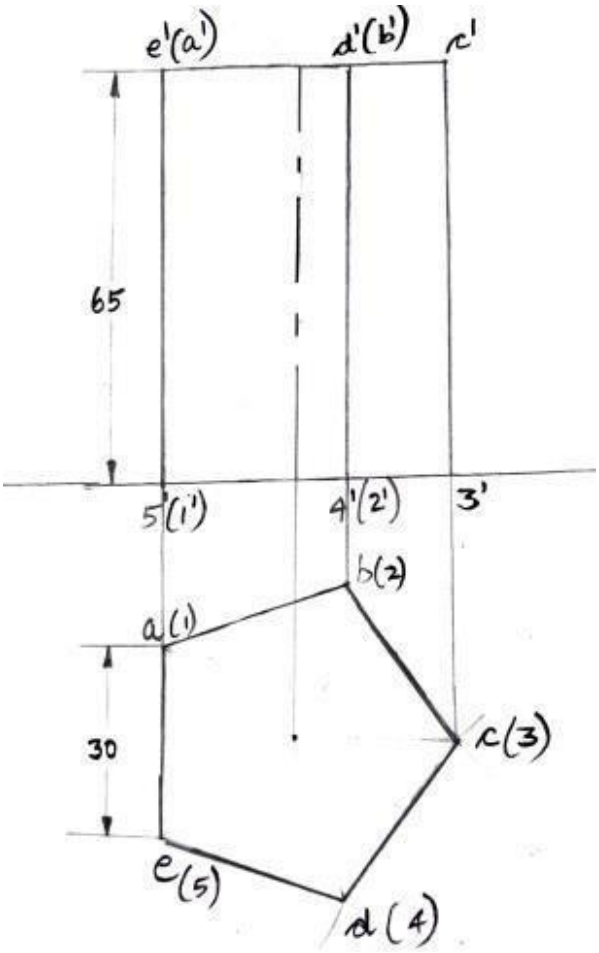
8. A hexagonal pyramid side of base 30mm & height 60mm rests with its base on HP such that one of the edges of the base is parallel to & 10mm in front of VP. Draw its top and front view.



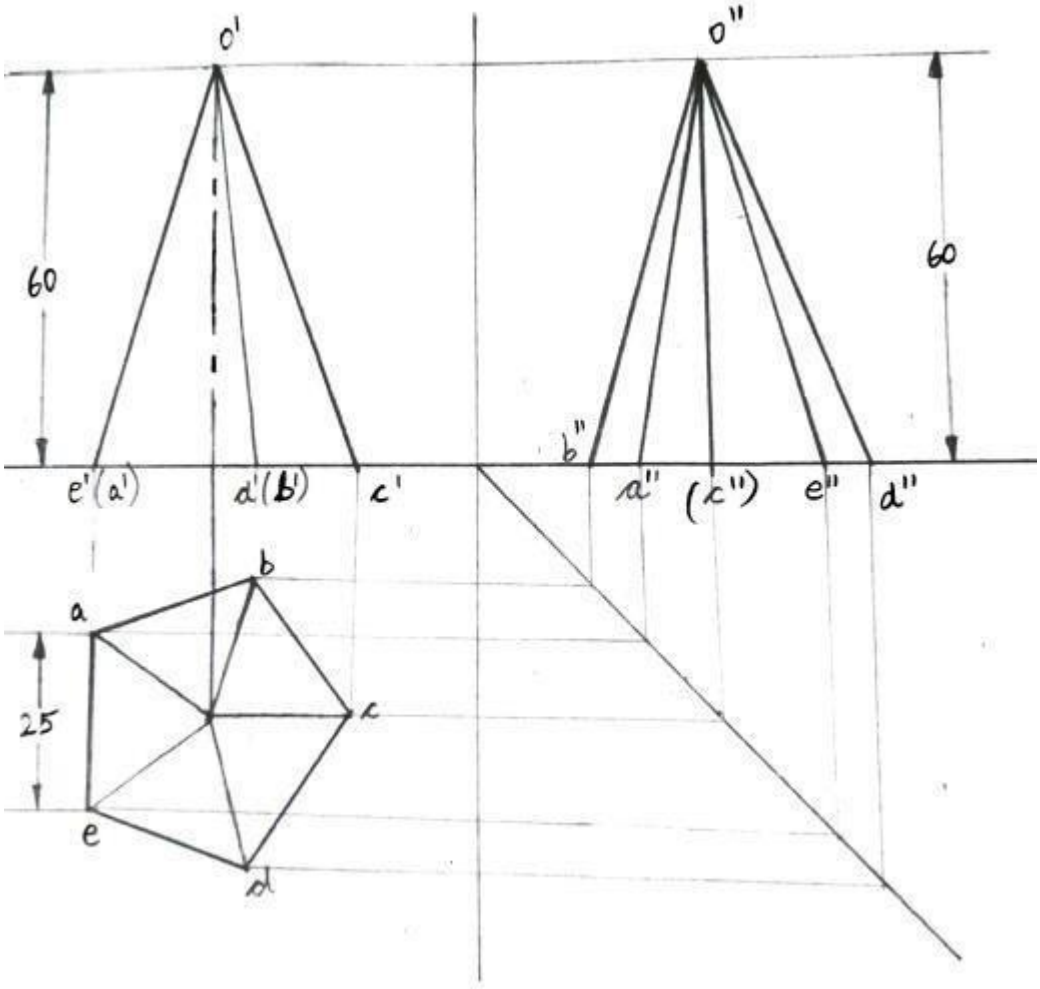
9. A hexagonal prism of base side 30mm, height 70mm rests on the HP on its base and one of its base edges is perpendicular to VP. Draw the front and top view.



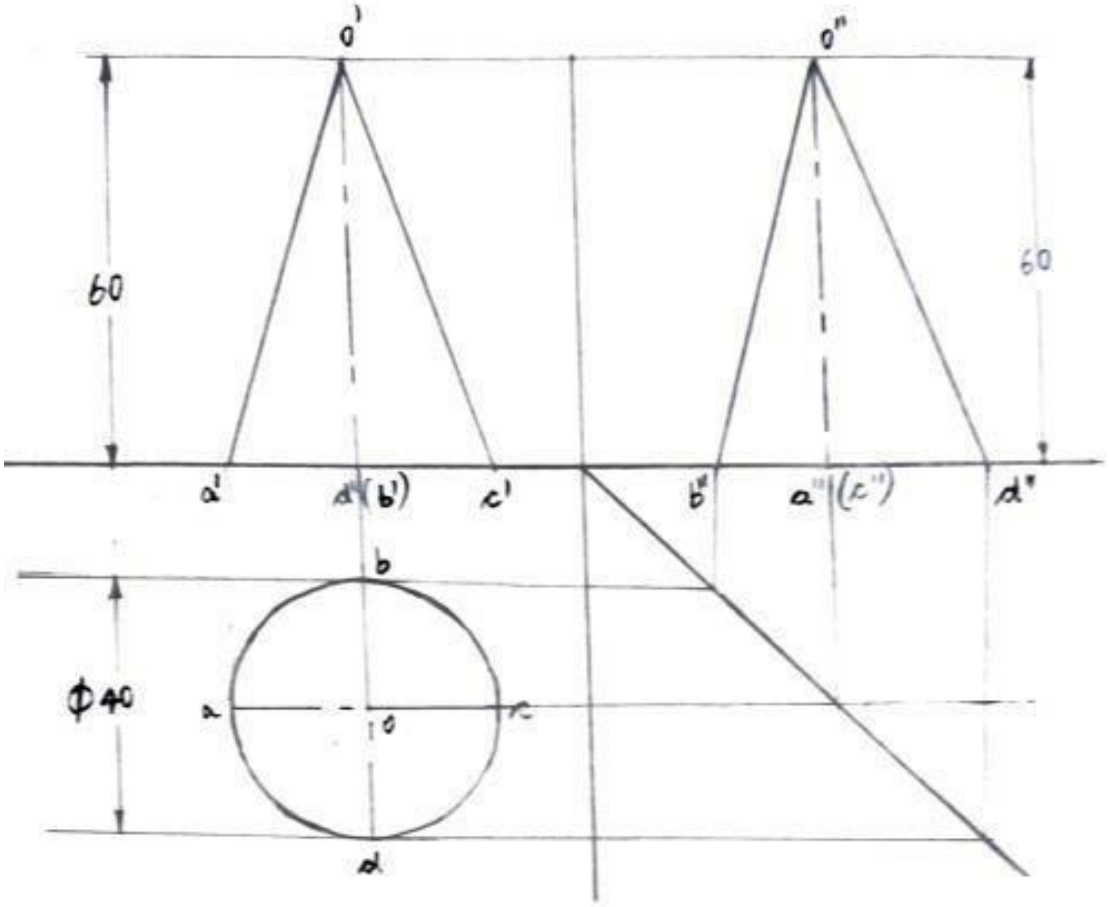
10. A Pentagonal prism of base side 30mm & height 65mm rest with its base on HP such that one of the edges of the base is perpendicular to VP. Draw the top view and front view of the prism.



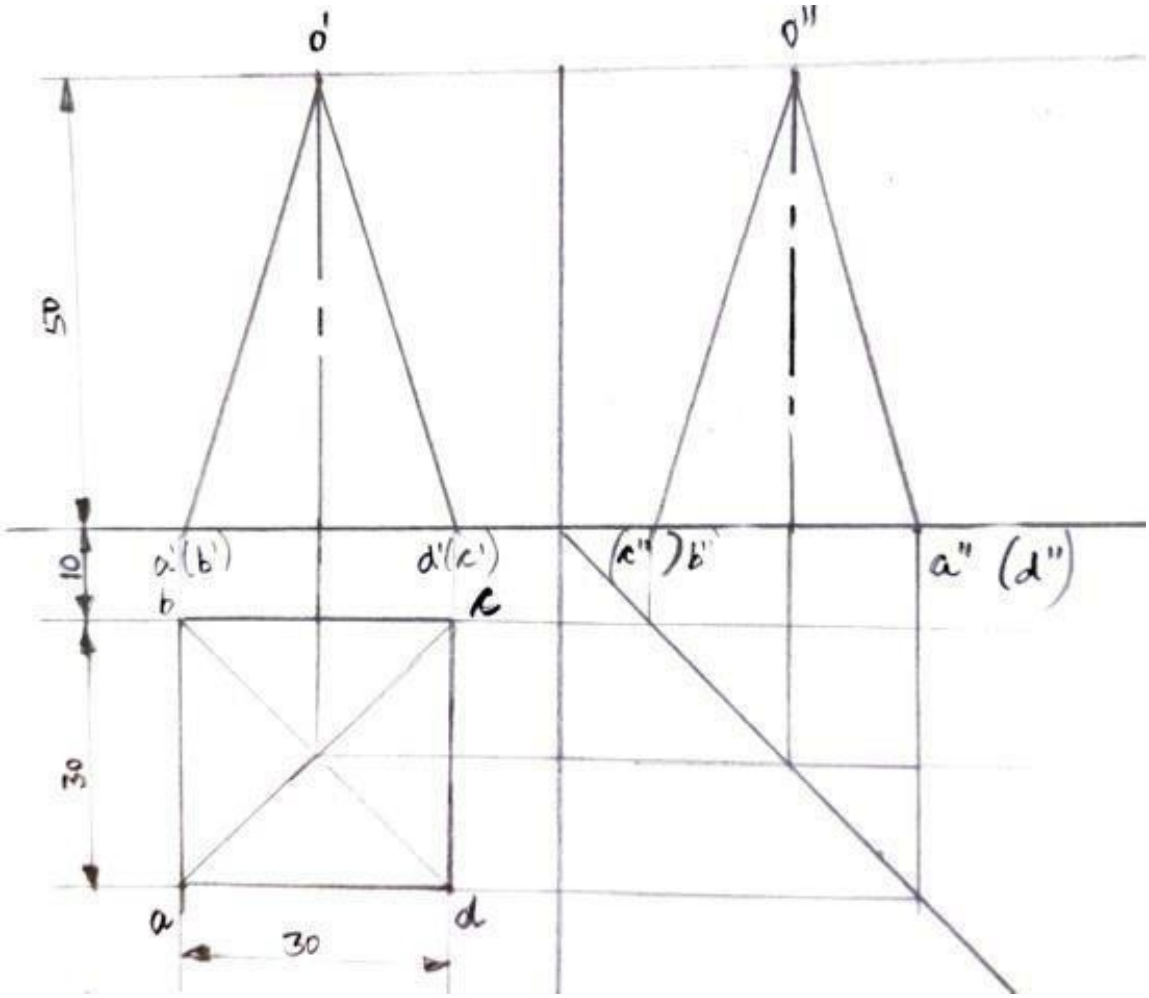
11.A Pentagonal pyramid of base side 25mm & height 60mm rest with its base on HP such that one of the edges of the base is perpendicular to VP. Draw the top view, front view and left side view of a pyramid.



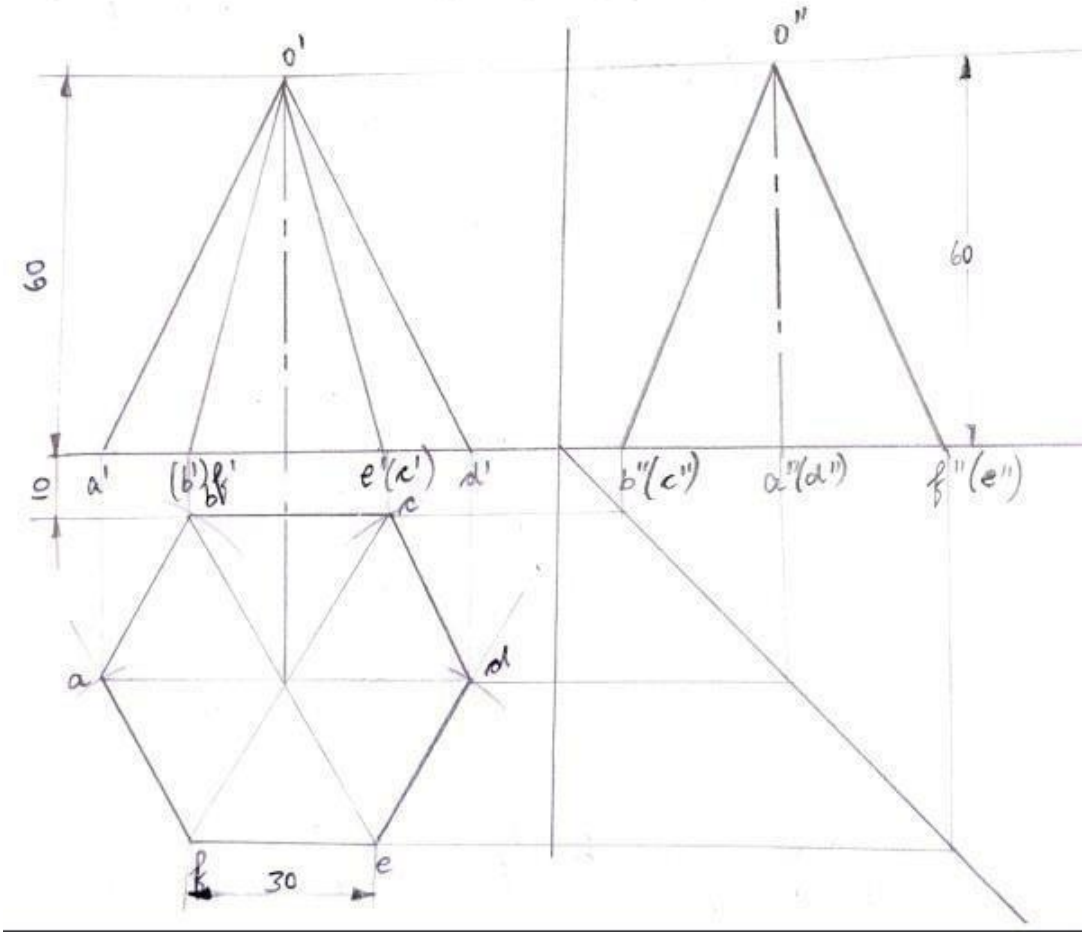
12.A right circular cone of base 40mm dia & height 60mm is resting with itsbase on HP. Draw the top view, front view and left side view of the cone.



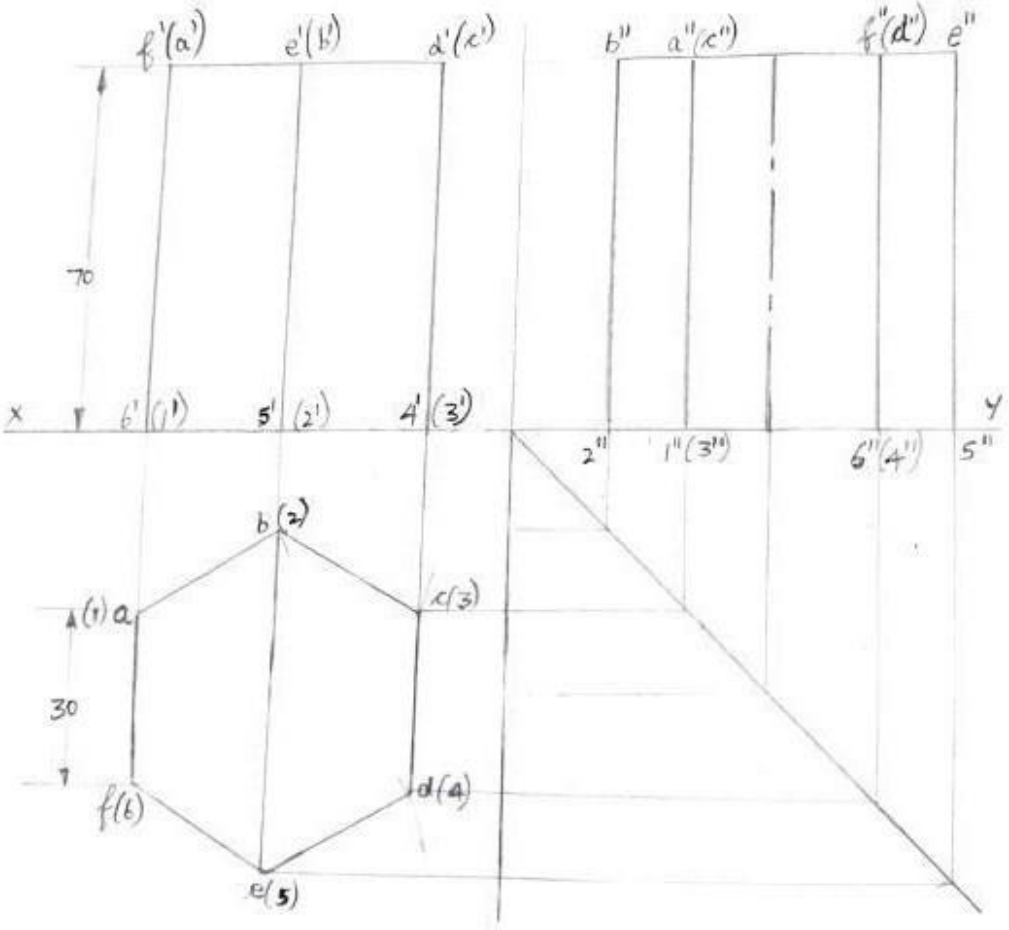
13.A square pyramid, side of base 30mm & axis 50mm long rest with its base on HP, such that one of the edges of the base is parallel to and 10mm in front of VP. Draw its top, front and left side view.



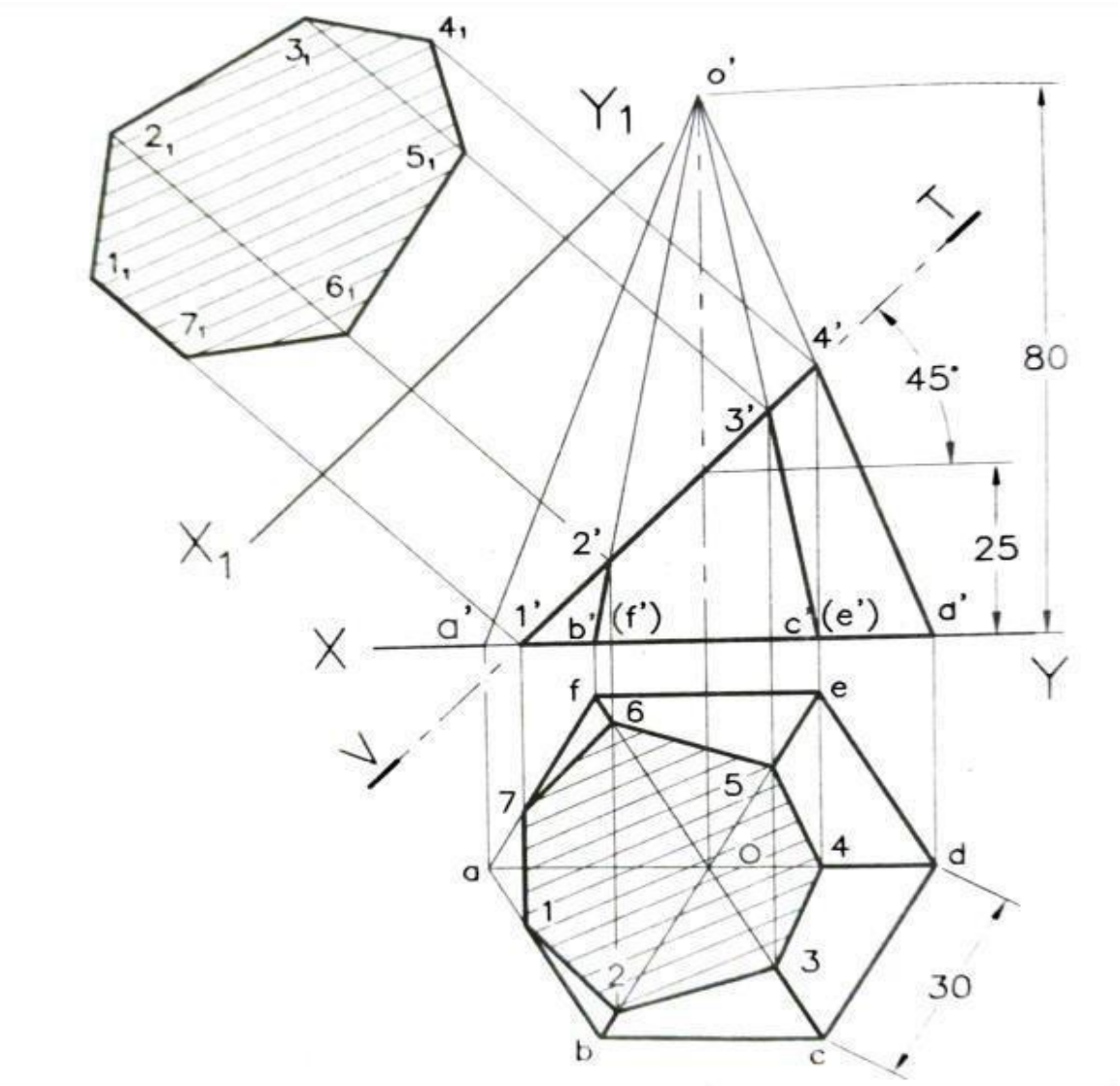
14.A hexagonal pyramid side of base 30mm & height 60mm rests with base on HP such that one of the edges of the base is parallel to & 10mm in front of VP. Draw its top, front & left side view.



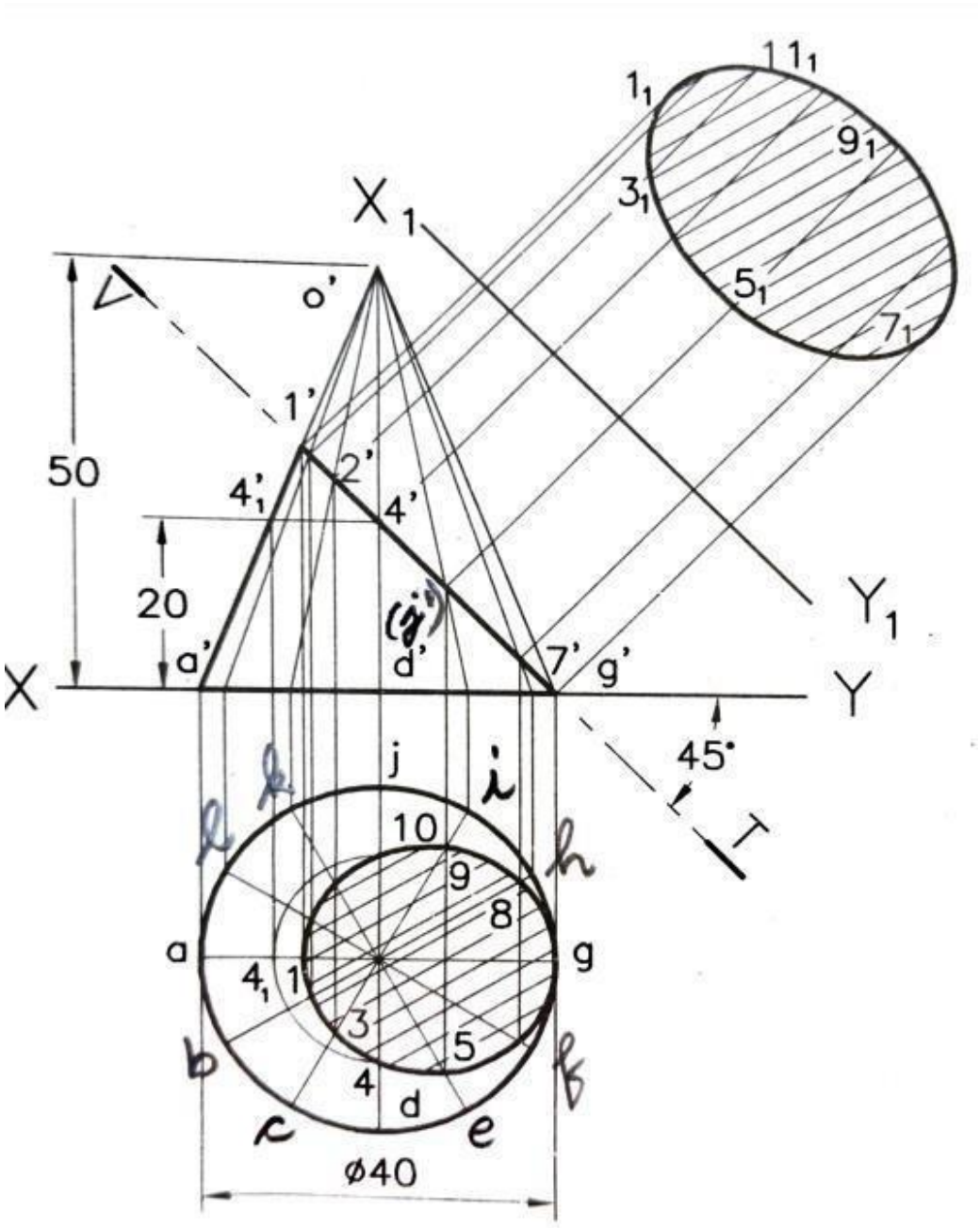
15.A hexagonal prism of base side 30mm, height 70mm rests on the HP on its base and one of its base edges is perpendicular to VP. Draw the front view, top view and left side view.



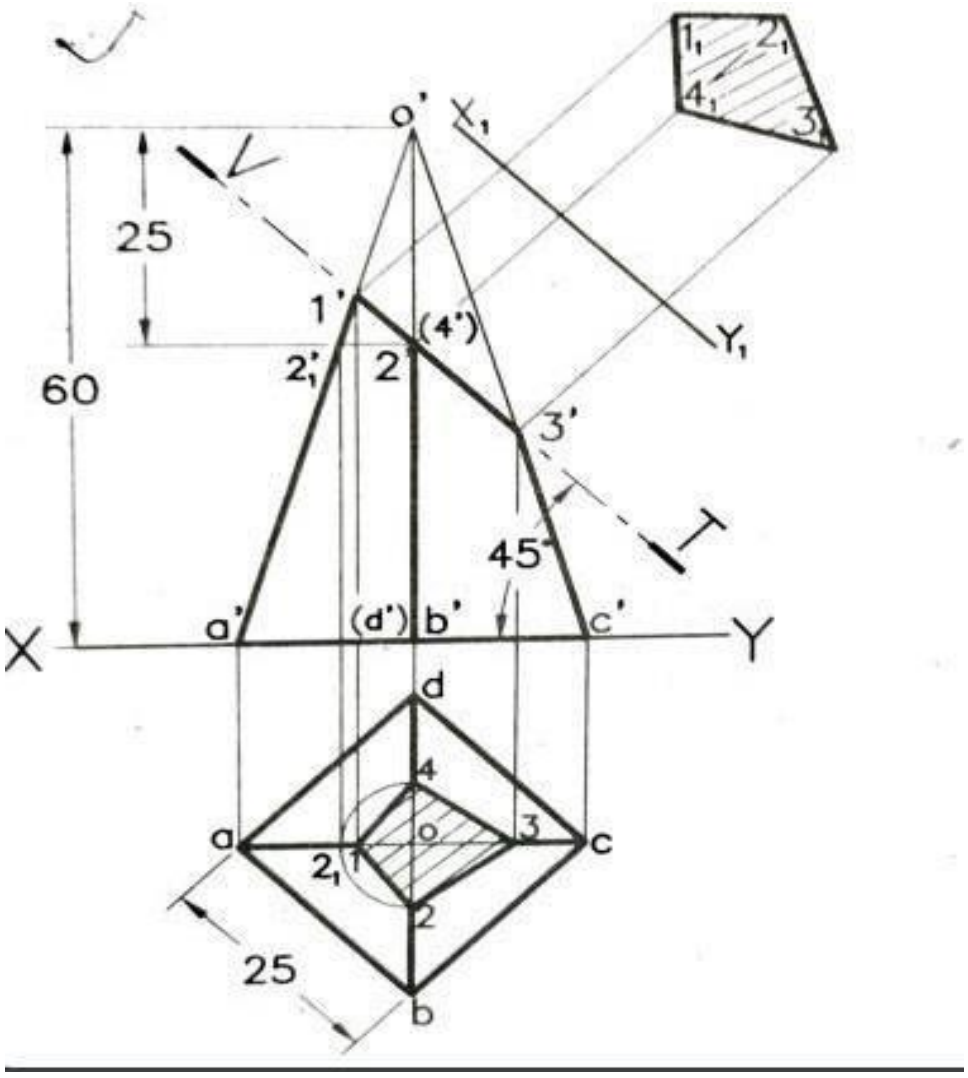
16.A hexagonal pyramid of base side 30mm and axisheight80mm is lying on the ground its base with a base edge parallel to VP. It is cut by a plane perpendicular to the VP, inclined at 450 to the HP and meets the axis at a point 25mm from the base. Draw the elevation, sectional plan and true shape of the section.



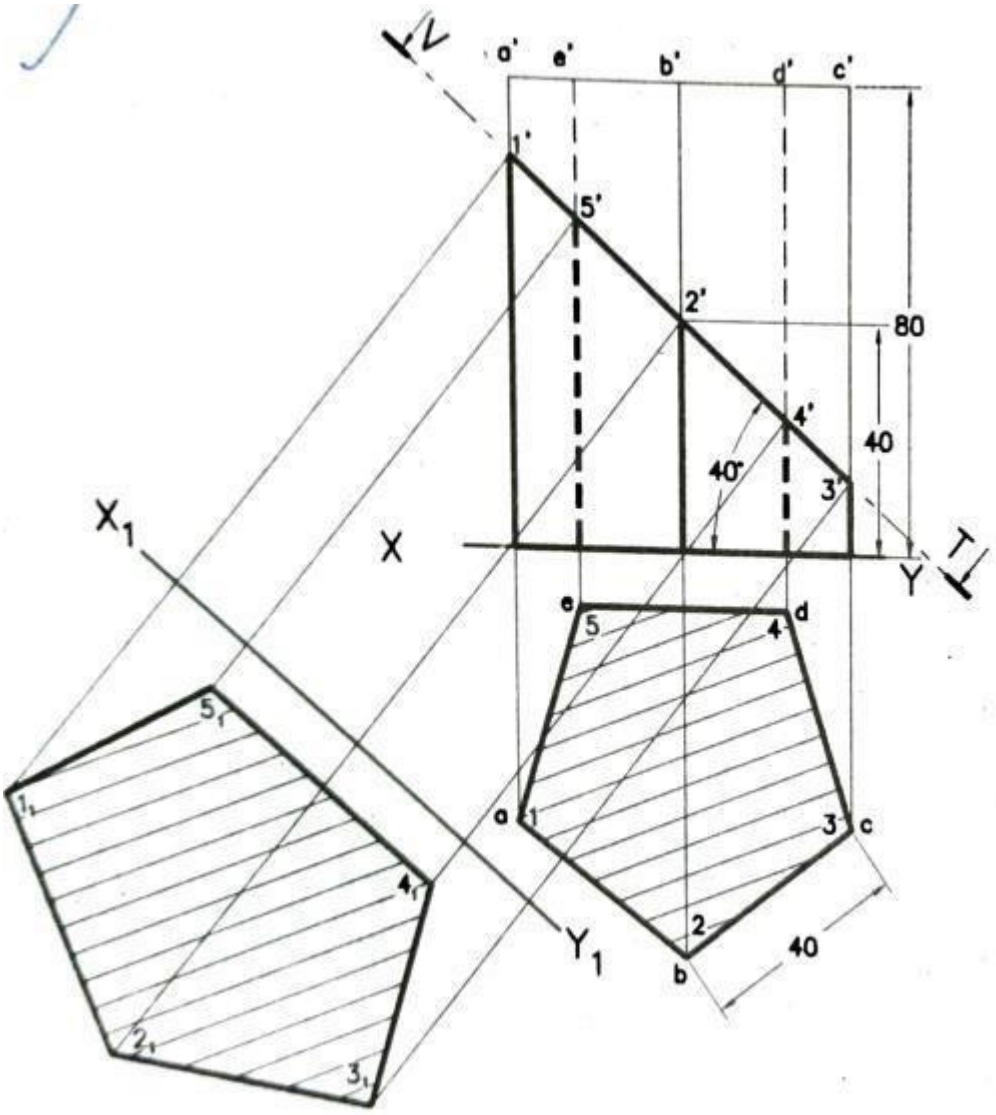
17.A cone diameter 40mm and axis 50mm rests on its base on HP. Itis cut by a plane inclined at 450 to HP and perpendicular to VP, and also passes through a point on the axis which is 20mm above HP. Draw the sectional plan, elevation the true shape of the section.



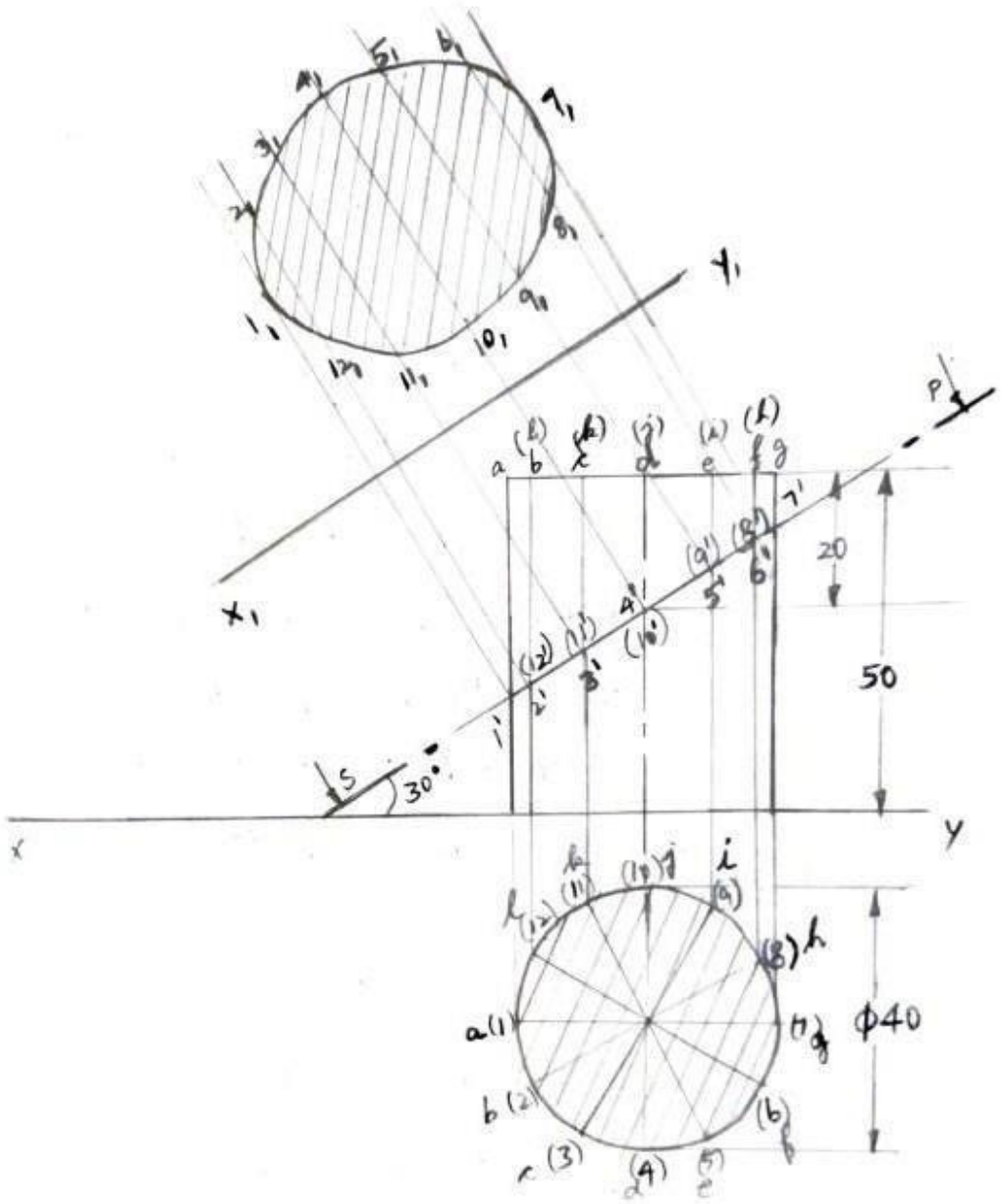
18. A square pyramid of side of base 25mm and height 60mm rests on HP on its base with two adjacent base edges perpendicular to VP. It is cut by a plane perpendicular to the VP and inclined at 450 to HP. The cutting plane meets the axis at 25mm from the vertex. Draw the elevation, sectional plan and true shape of the section.



19. A pentagonal prism axis vertical and base edge 40mm is 80mm high. It is cut by a plane perpendicular to VP, inclined at 400to HP bisecting the axis. Draw the elevation, sectional plan and true shape of the section.

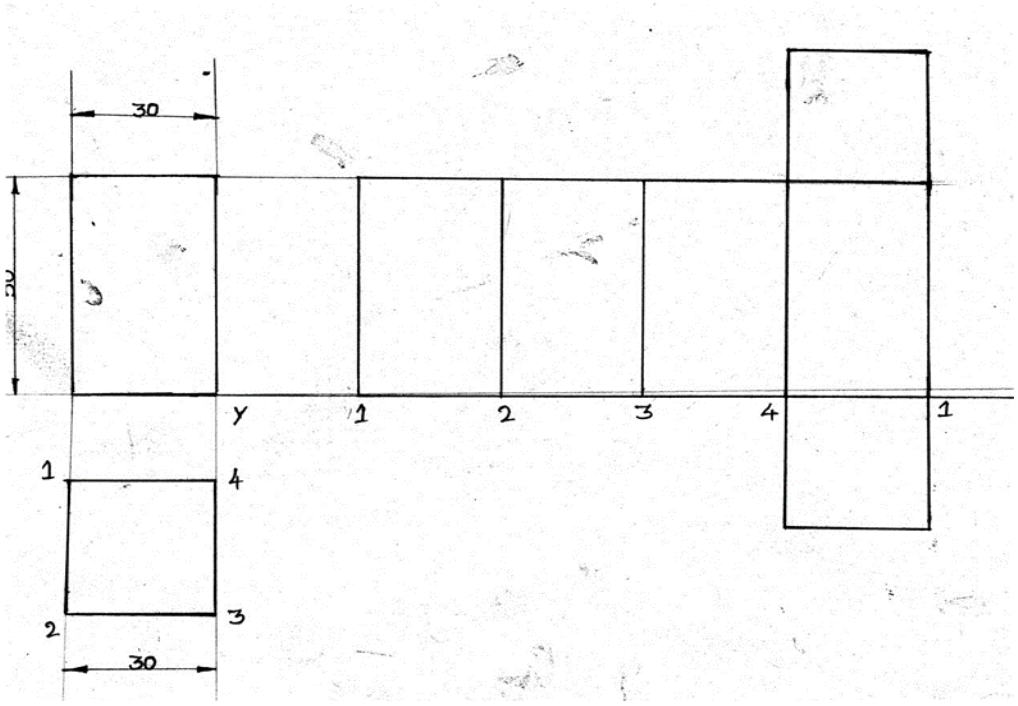


20. A cylinder of 40mm diameter and axis 50mm height is resting on the ground on its base. It is cut by a plane perpendicular to VP and inclined at 300 to the HP and meets the axis at a point 20mm from the top. Draw the sectional pan, elevation and true shape of the section.

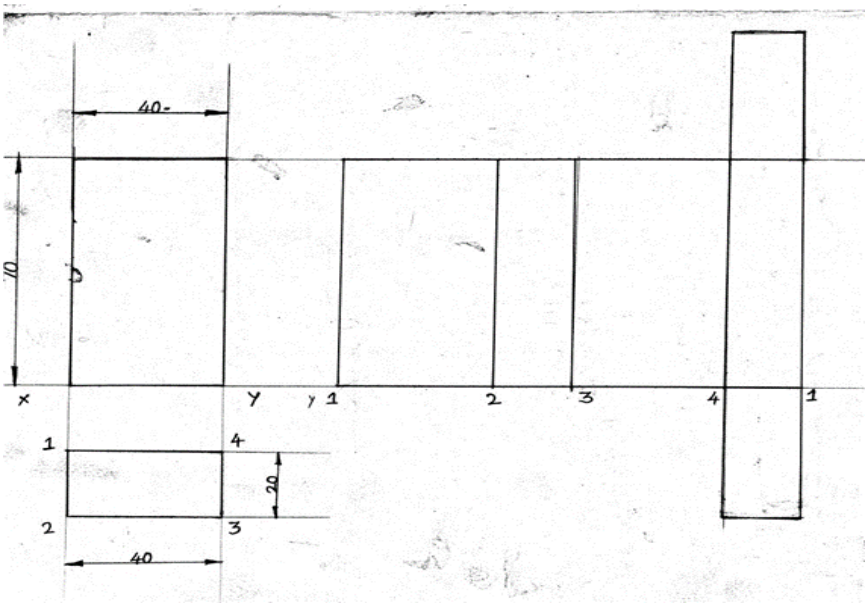


UNIT-III
DEVELOPMENT OF SURFACE

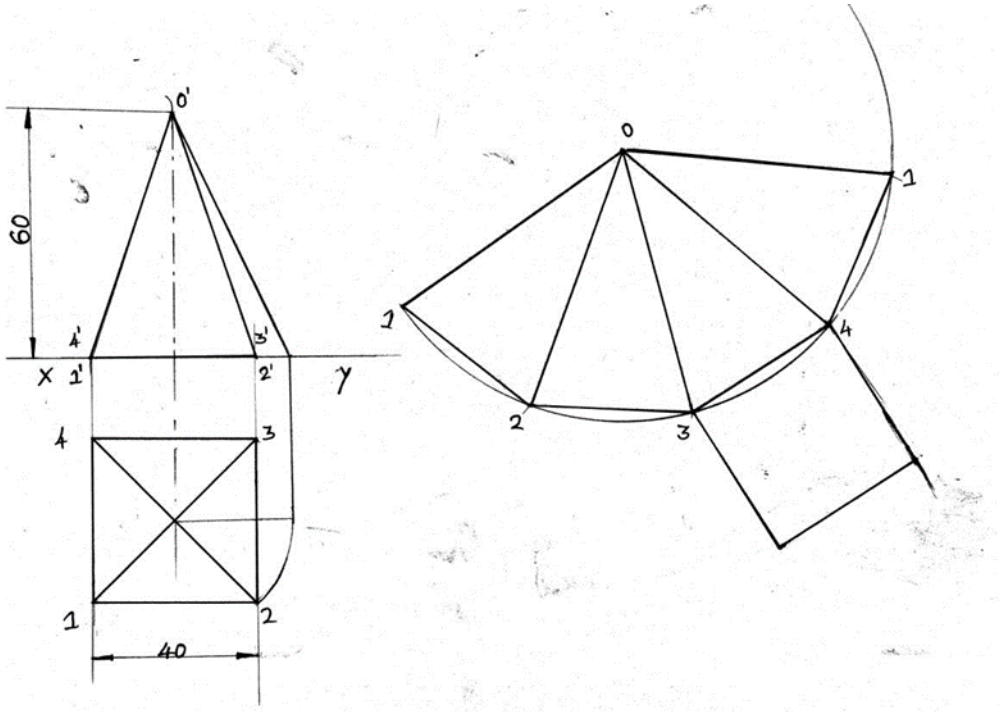
1. A square prism sizes 50mmx30mm. Draw the development of the lateral surface.



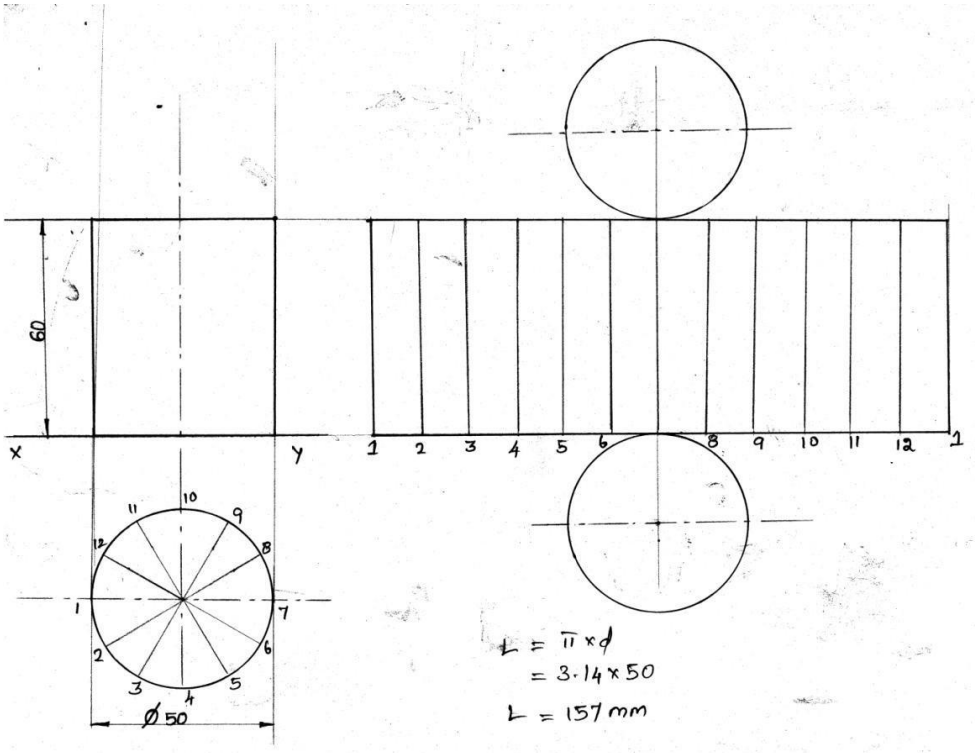
2.A rectangle prism sizes 70mmx40mmx20mm. Draw the development of the lateral surface.



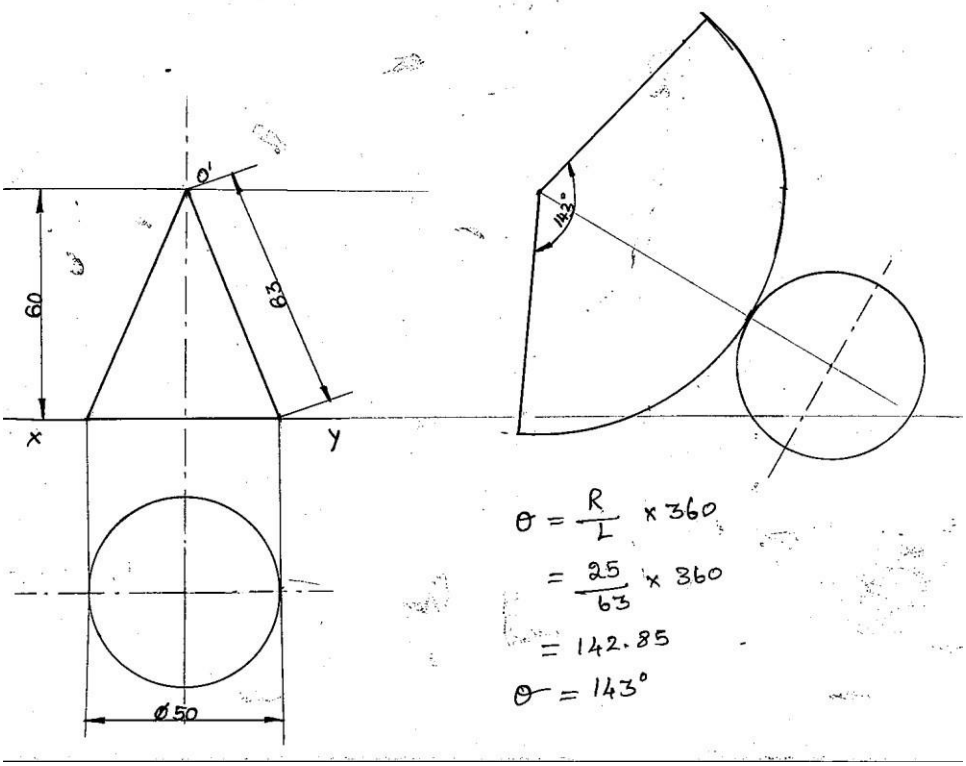
3.A square pyramid sizes 60mmx40mm. Draw the development of the lateral surface.



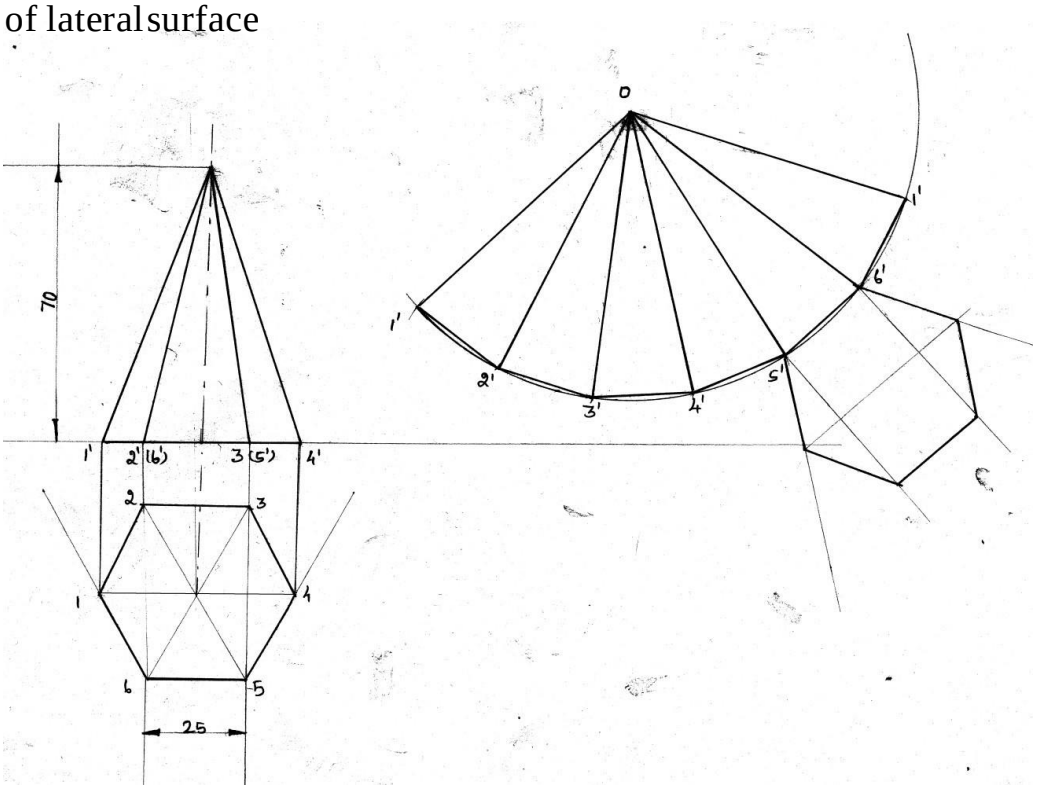
4. A cylinder 60mm long 50mmdiameter. Draw the development of lateral surface.



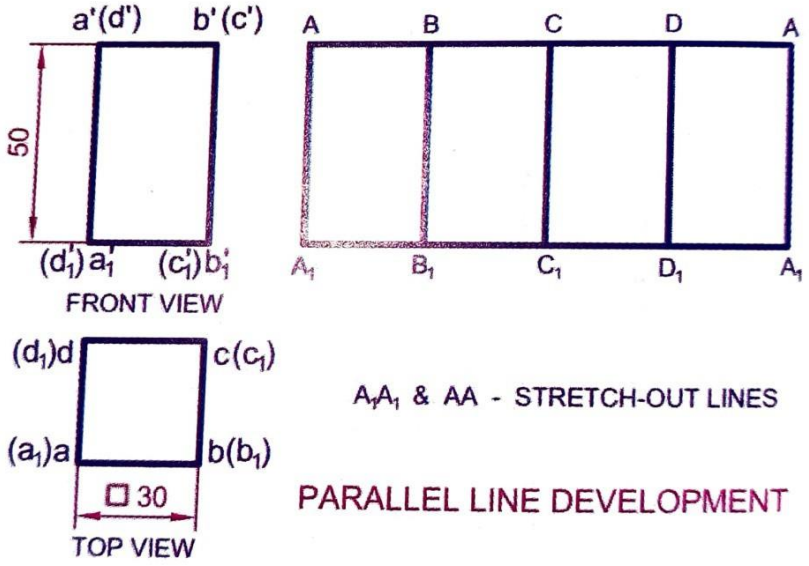
5. A cone of diameter 50mm and height is60. Draw the development of lateral surface.



6.A hexagon pyramid of base side 25mm and height 70mm. Draw the development of lateralsurface



7.Draw the development of the lateral surfaces of a right square prism of edge of base 30mm andaxis 50mm long.



8.A Cone of base diameter 50mm and axis height 65 mm rests with its base on HP. Asection plane perpendicular to V.P and inclined at 30 to H.P bisects the axis of the cone. Draw the development of the lateral surface of the truncated cone.

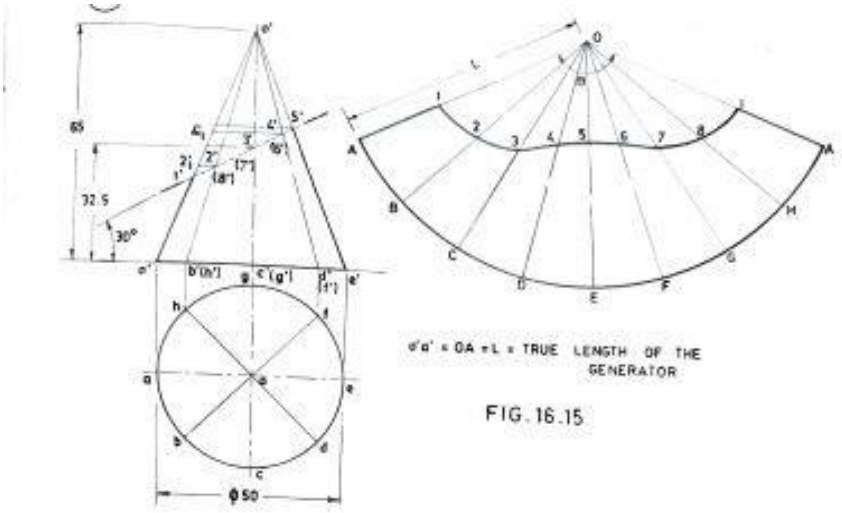


FIG. 16.15

9.A Square pyramid of base side 35mm and height 70mm rest on its base on the HP such that two adjacent sides of base are equally inclined to VP. It is sectioned bya plane perpendicular to VP, inclined at 30^0 to HP and passing through the midpoint of the axis.

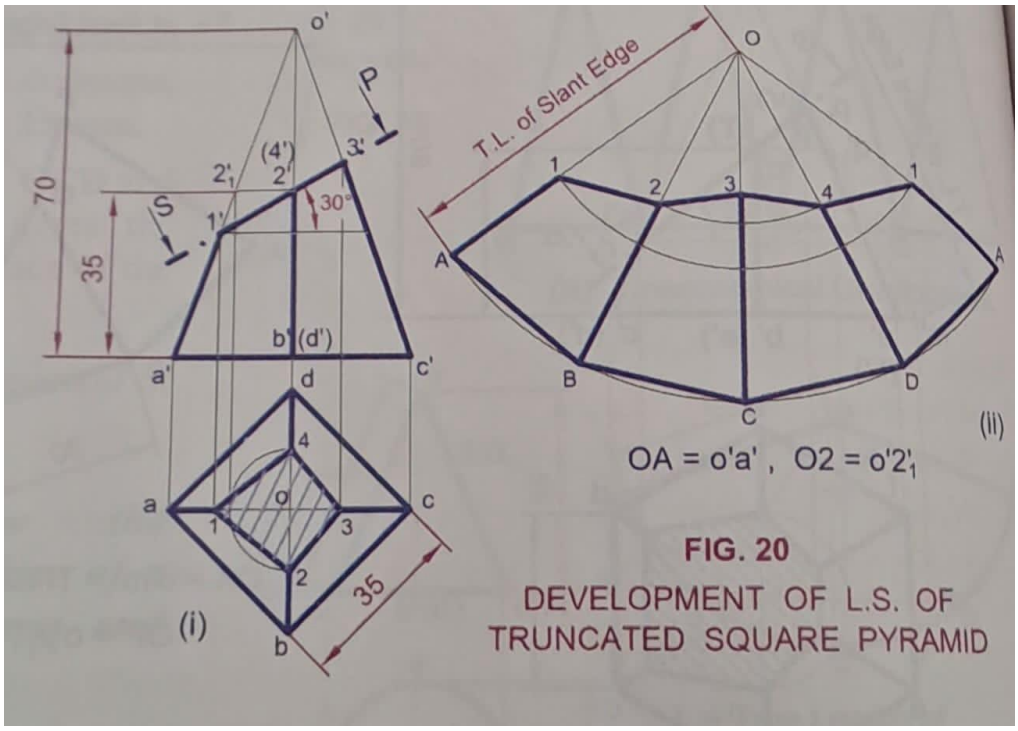


FIG. 20

DEVELOPMENT OF L.S. OF TRUNCATED SQUARE PYRAMID

10.A hexagonal prism, edge of base 20mm and axis 50mm long, rest with its base on HP such that one of its rectangular faces is parallel to VP. It is cut by a plane perpendicular to VP, inclined at $45^0$to HP and passing through the right corner of the top face of the prism. (i) Draw the sectional top view. (ii) Develop the lateral surfaces of the truncated prism.

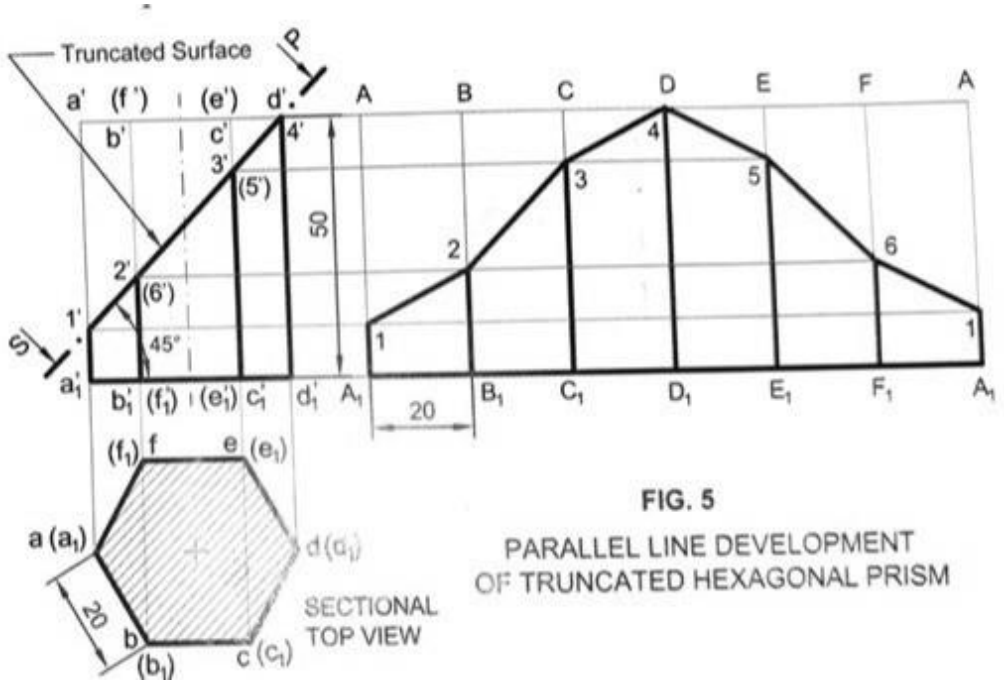


FIG. 5

PARALLEL LINE DEVELOPMENT OF TRUNCATED HEXAGONAL PRISM

11.Draw the development of the lateral surface of a hexagonal prism of 24mm base edge and 68mm height. An insect moves on its surface from a corner on the base to the diametrically opposite corner of the top faces by the shortest route. Trace graphically the path of the insect in front view.

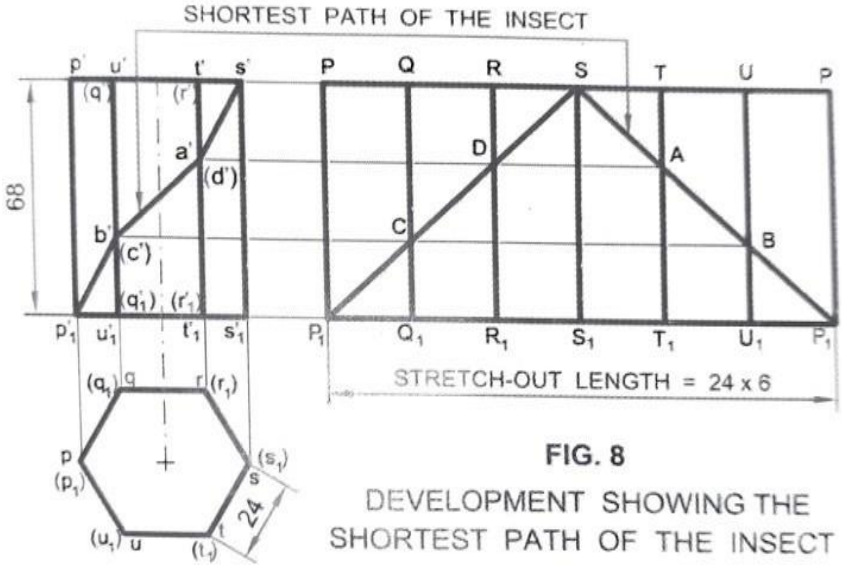


FIG. 8
DEVELOPMENT SHOWING THE SHORTEST PATH OF THE INSECT

12. Draw the development of the lateral surfaces of the lower portion of a cylinder of diameter 50mm and axis 70mm when sectioned by a plane inclined at 40^0 to HP and perpendicular to VP andbisecting the axis.

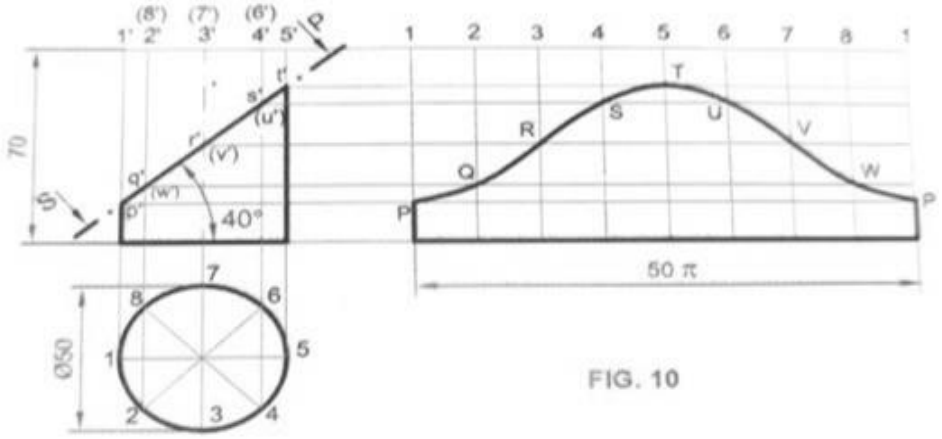


FIG. 10

13. Draw the development of the lateral surfaces of a square pyramid, side of base 25mm and height 50mm, resting with its base on HP and an edge of the parallel to VP

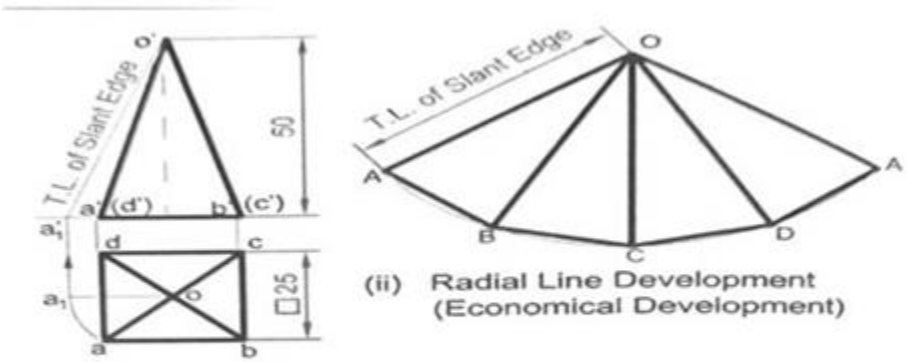


FIG. 16

14. A hexagonal prism of base side 20mm and height 45 mm is resting on one of its ends on HP withtwo of its lateral faces parallel to VP. It is cut by a plane perpendicular to VP and inclined at 30 to HP. The plane meets the axis at a distance of 20mm above the base. Draw the development of lateral surfaces of lower portion of the prism

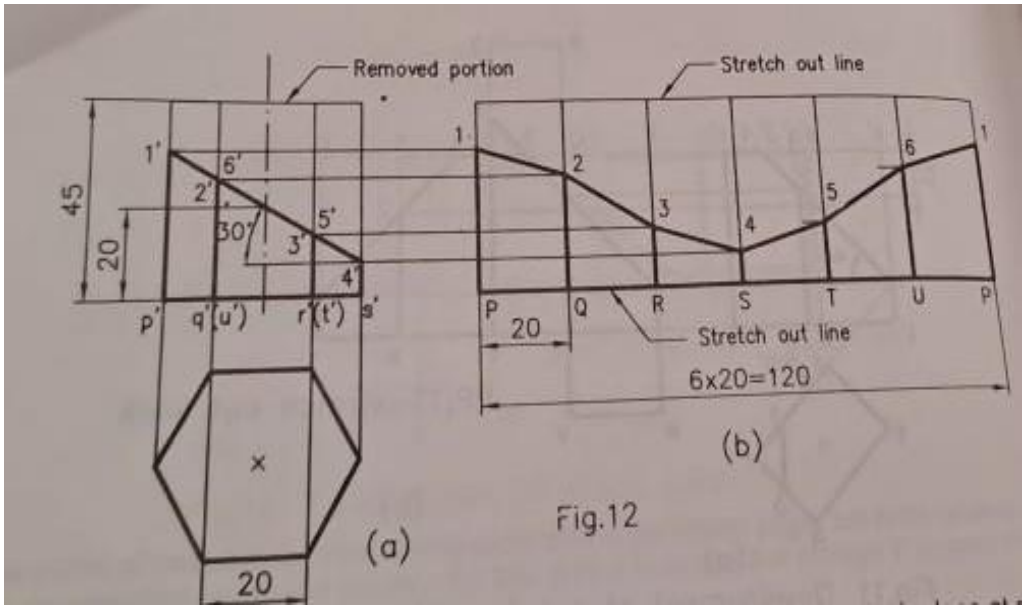
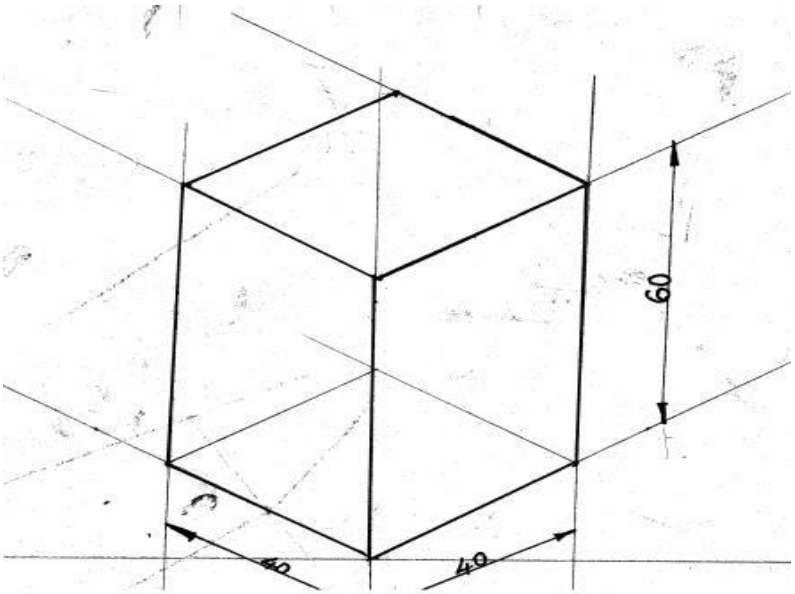


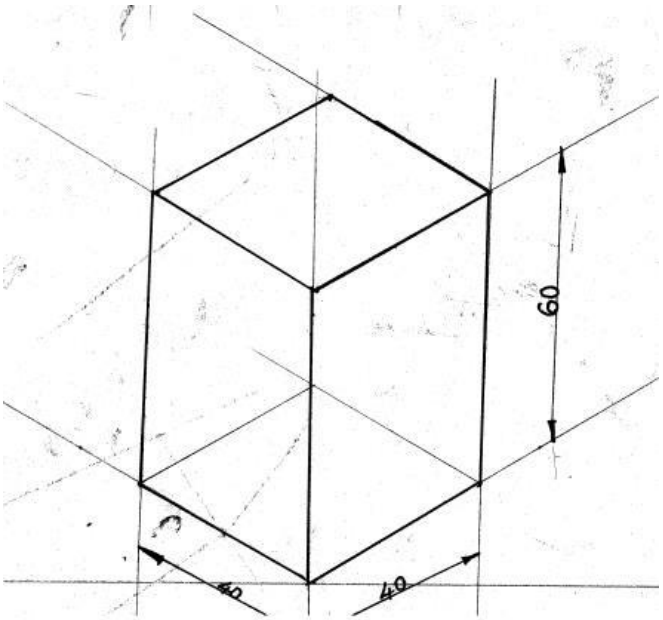
Fig.12

Unit-4

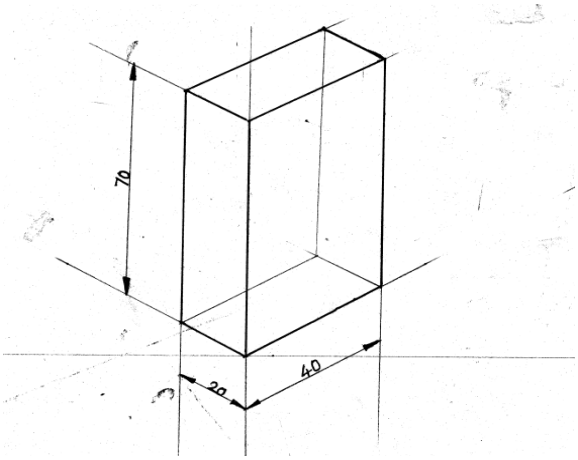
1. Draw the isometric view of the cube of sides 40mmx40mm



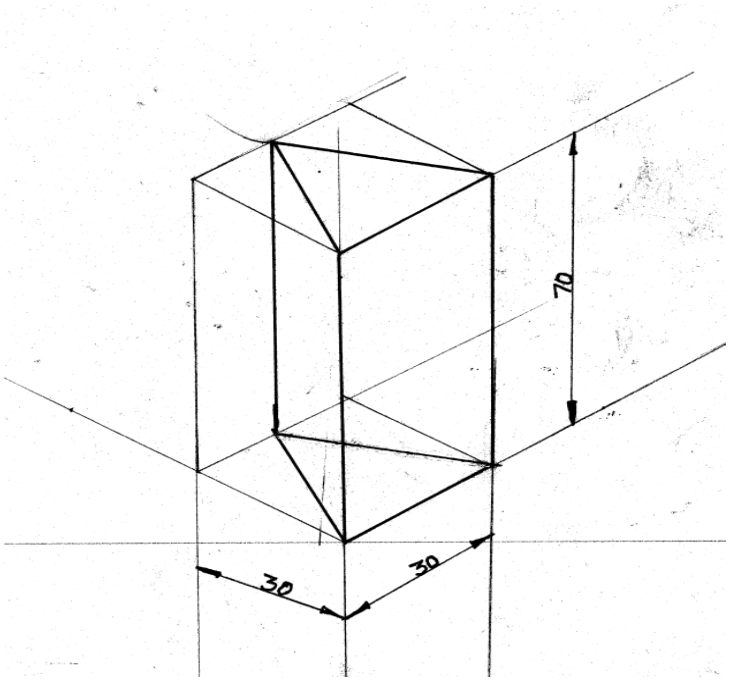
2. Draw the isometric view of the square prism of height 60mmx 40mmx40mm.



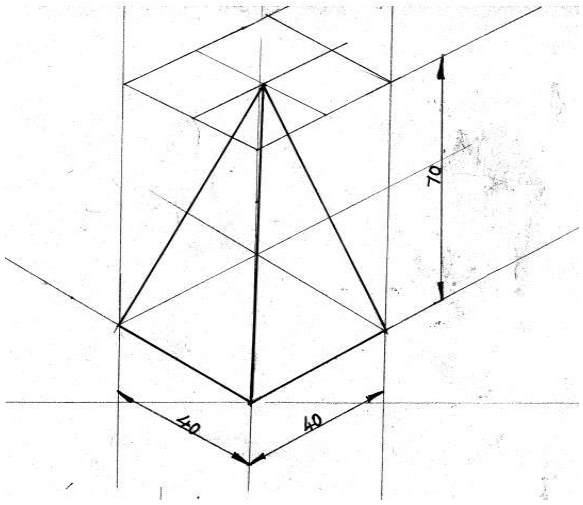
3. Draw the isometric view of the rectangular 70mmx 40mmx20mm



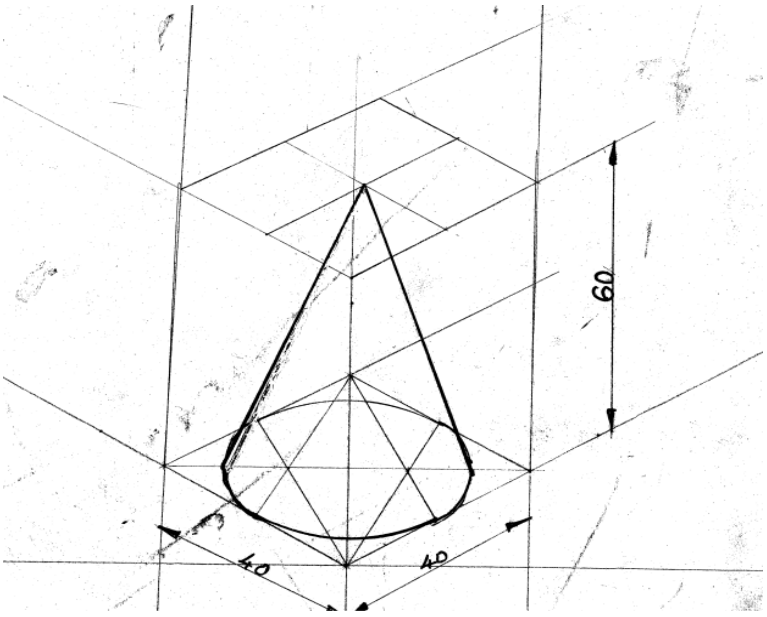
4. Draw the isometric view of the triangular prism 70mmx30mm



5. Draw the isometric view of the square pyramid height 70mmx40mm.



6. Draw the isometric view of the cone of diameter 40mm and height 60mm



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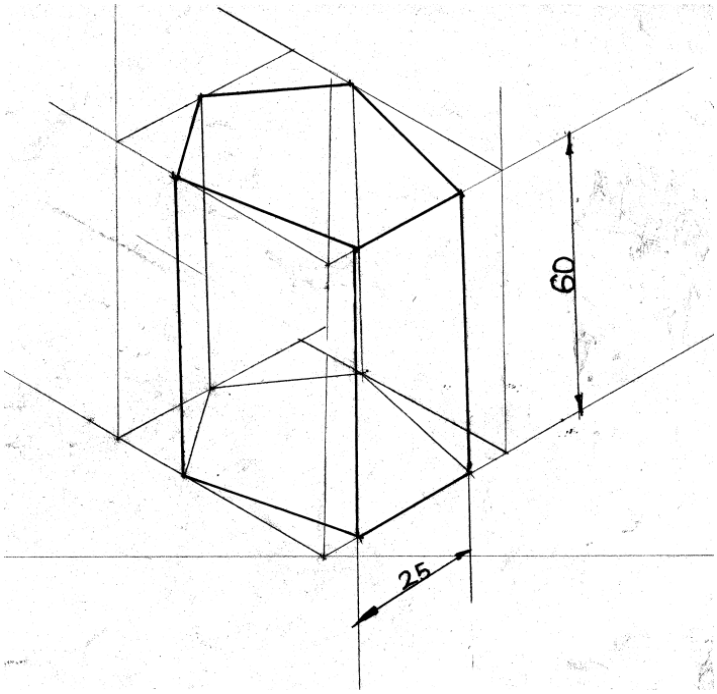
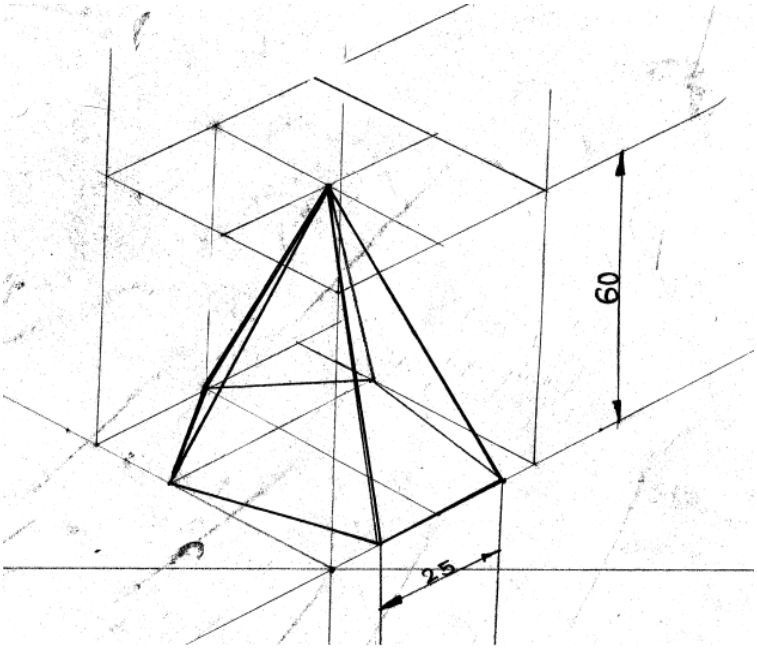
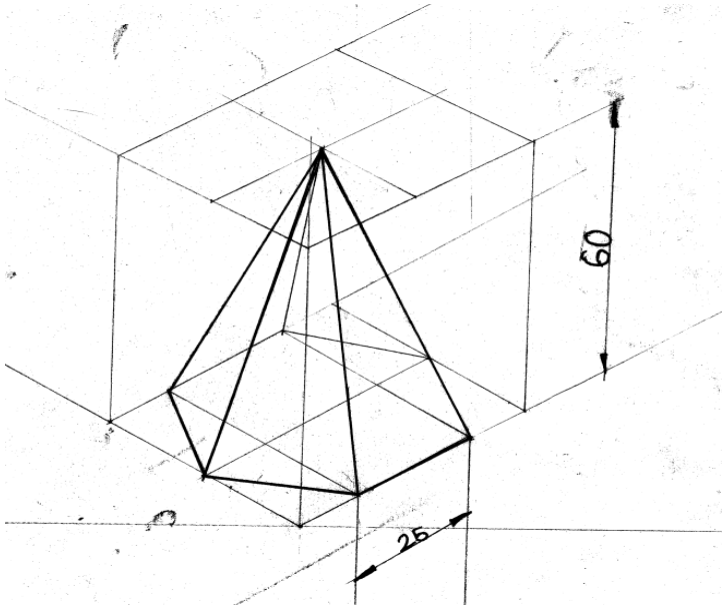
7. Draw the isometric view of the pentagon prism base 25mm and height 60mm.



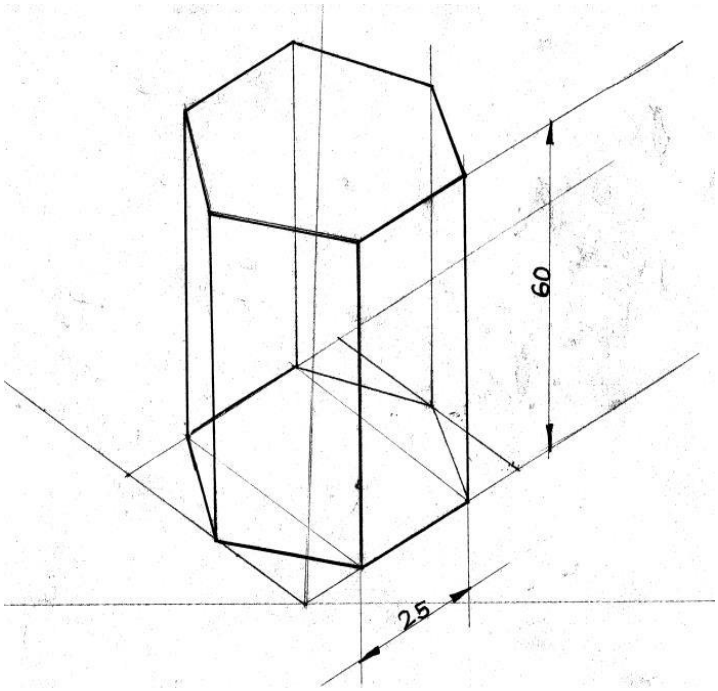
8. Draw the isometric view of the pentagon pyramid base 25mm and height 60mm



9. Draw the isometric view of the hexagon pyramid base 25mm and height 60mm



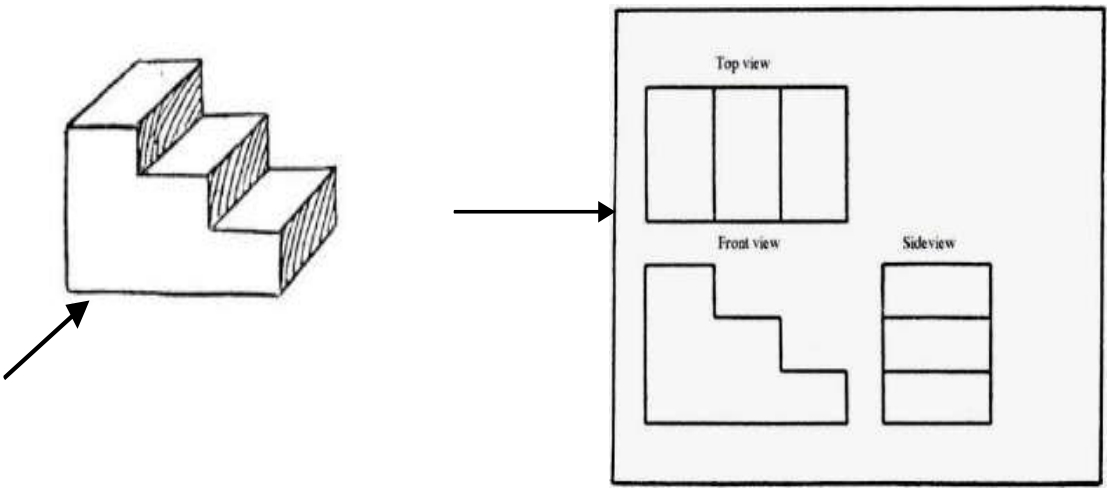
10. Draw the isometric view of the hexagon prism base 25mm and height 60mm



UNIT V

Orthographic Projection

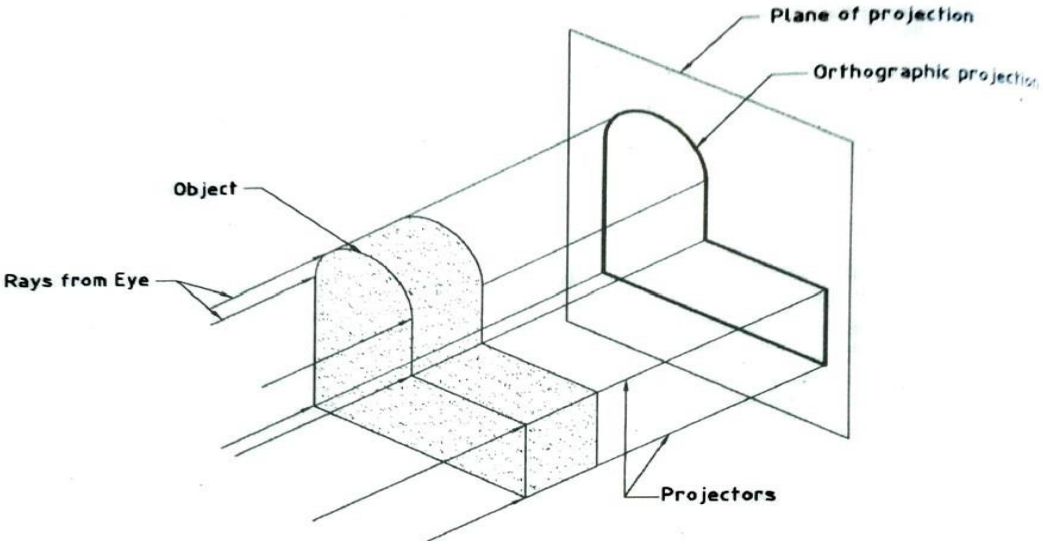
When the Projectors are parallel to each other and also perpendicular to the plane the projection iscalled orthographic Projection



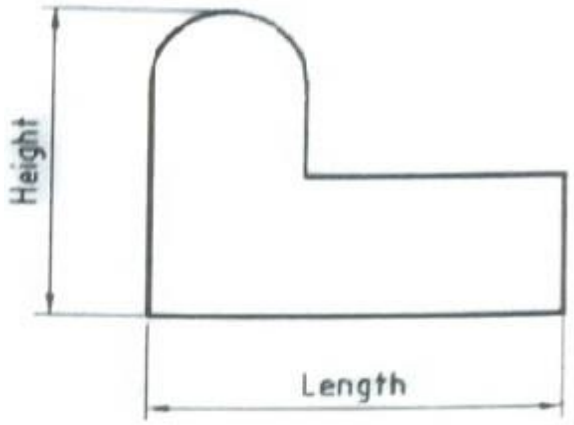
Orthographic projection of given object

Orthographic Projection is a way of drawing an 3D object from different directions. Usually a front, side and plan view is drawn so that a person looking at the drawing can see all the important sides. Orthographic drawings are useful especially when a design has been developed to a stage whereby it is almost ready to manufacture.

Principal planes of Projection



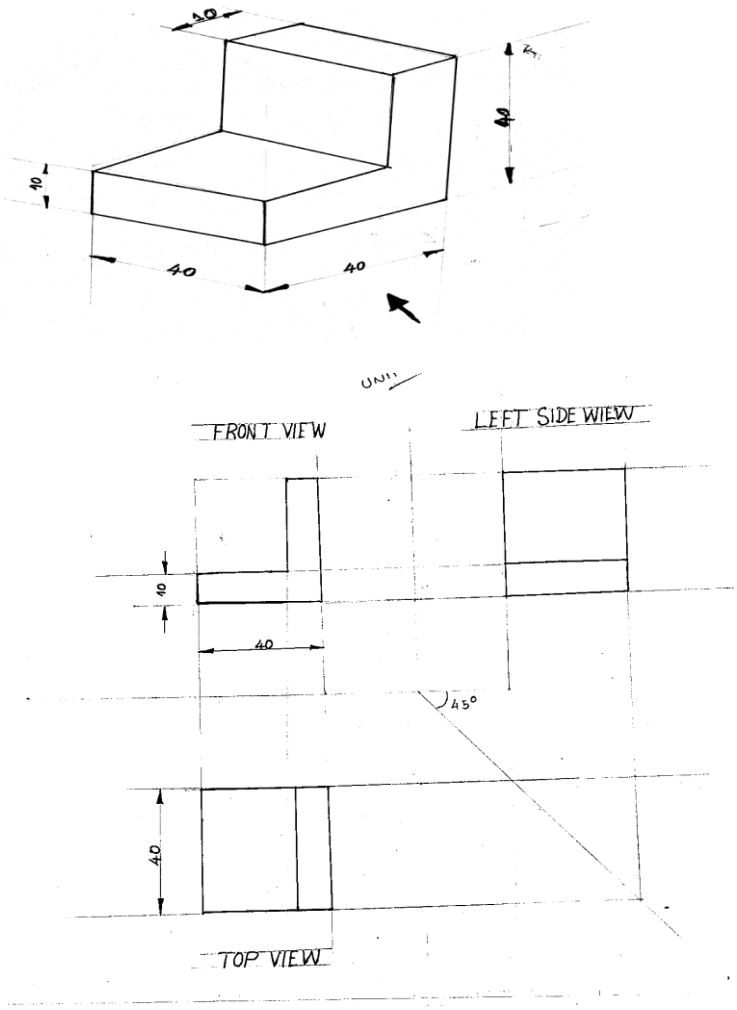
Imagine the observer standing theoretically at an infinite distance and the rays from his eyes are drawn parallel to each other and perpendicular to the plane of projection.These rays meet the plane of projection at many points. These points are joined in the correct order to get the image of the object in two dimensions as shown below.



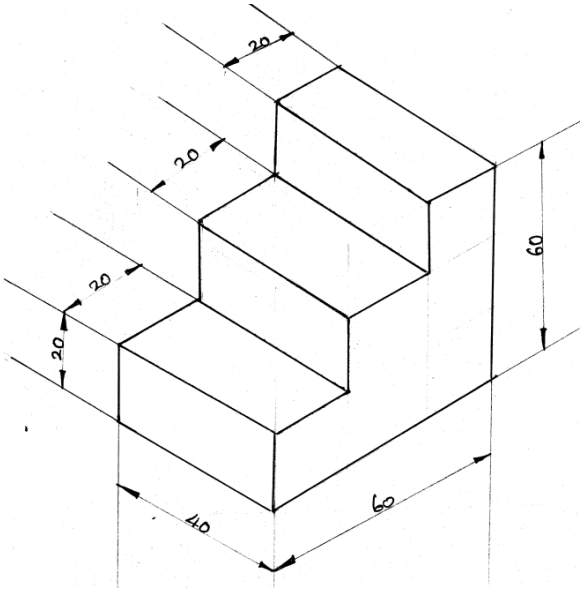
Principal planes:

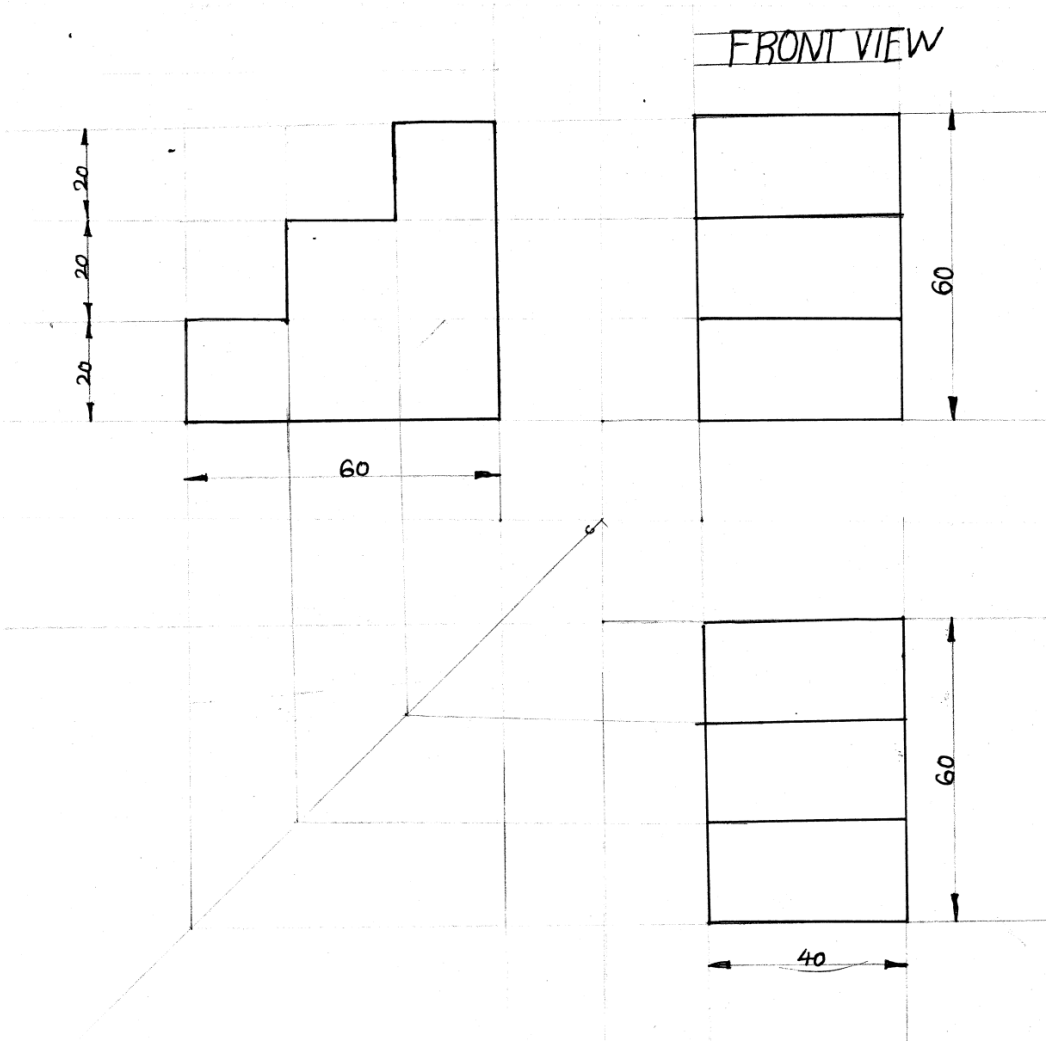
i) vertical plane(VP) is assumed to be placed vertically.The front view of the object is projected on to this plane.
ii) Horizontal plane (HP) is assumed to be placed horizontally.The top view of the object is projected on to this plane.
These principal planes are also known as reference planes. The planes considered are imaginary,transparent, and dimensionless.The reference planes VP and HP are placed in such a way that they intersect each other at right angles.As a result of intersection ,an intersecting line is obtained which is known as reference line.

1) Draw the front view ,topview and side view of the given object.

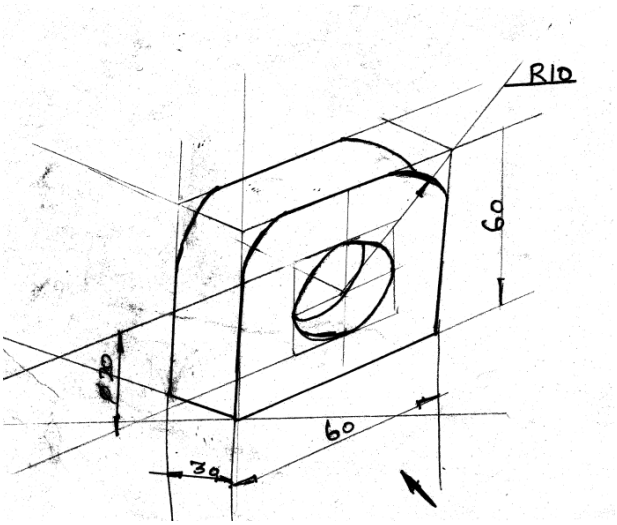


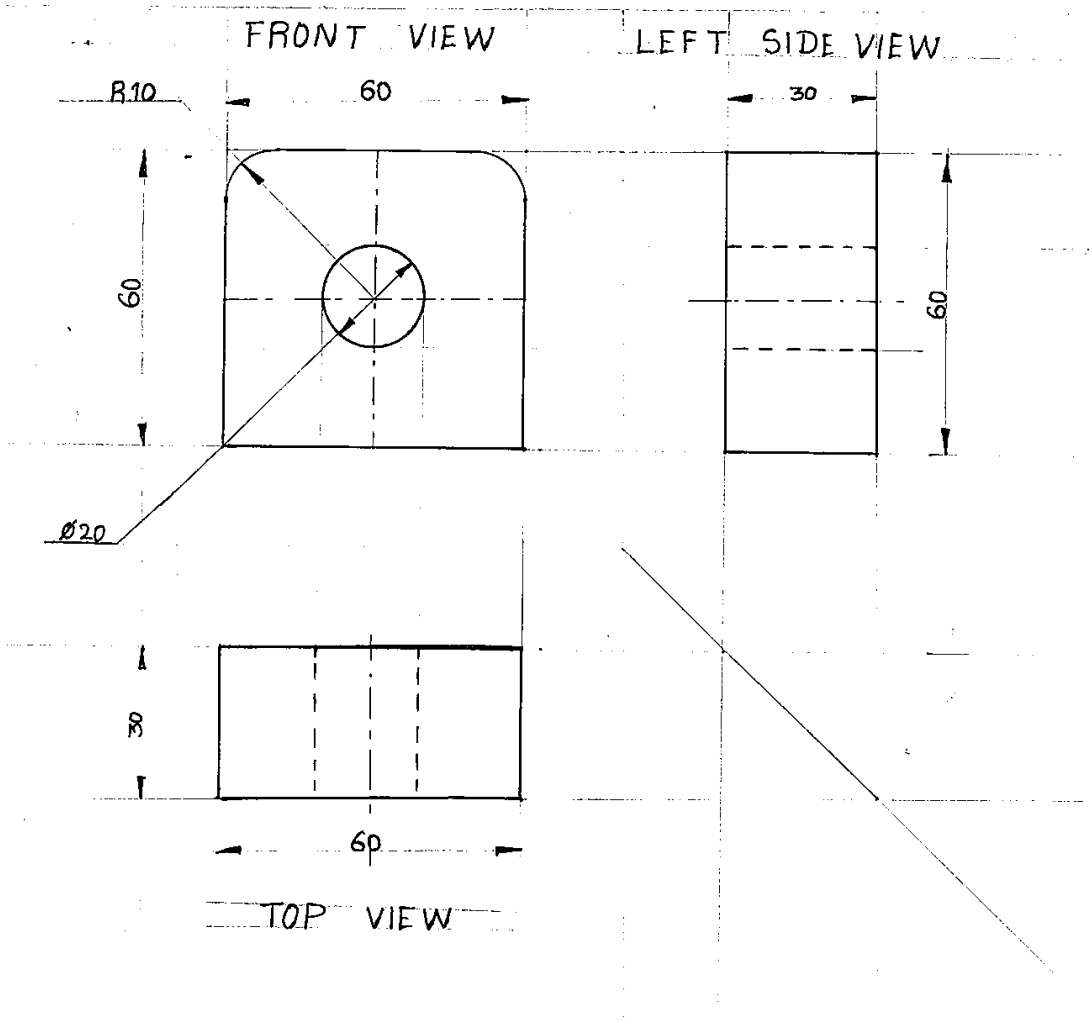
2) Draw the front view ,topview and side view of the given object.



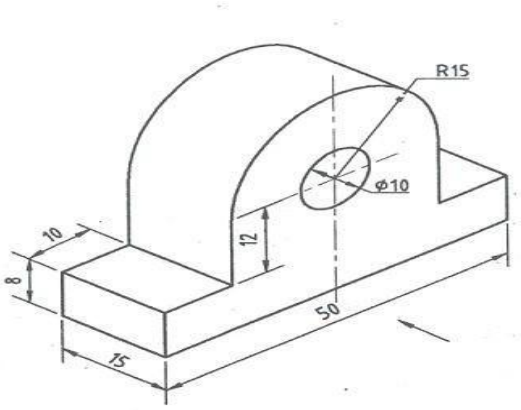


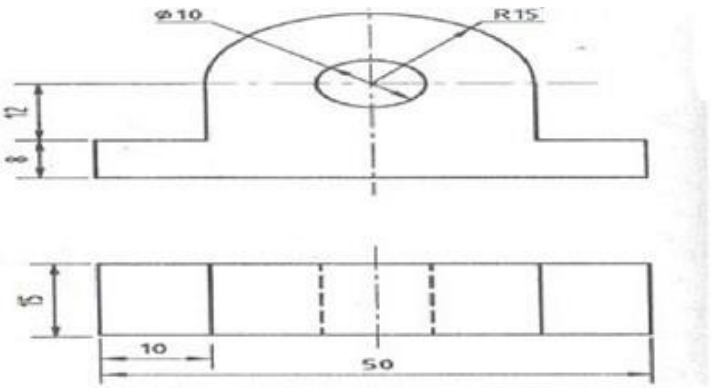
3) Draw the front view ,topview and side view of the given object.



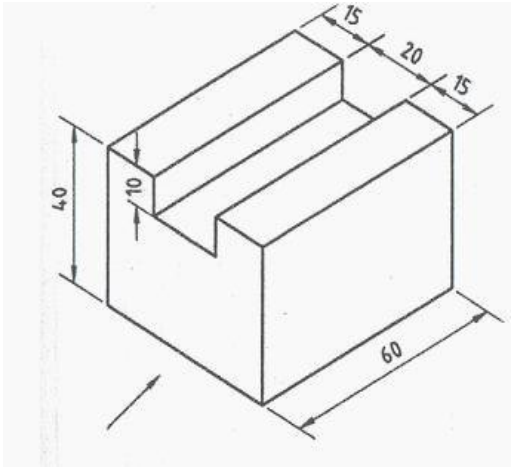


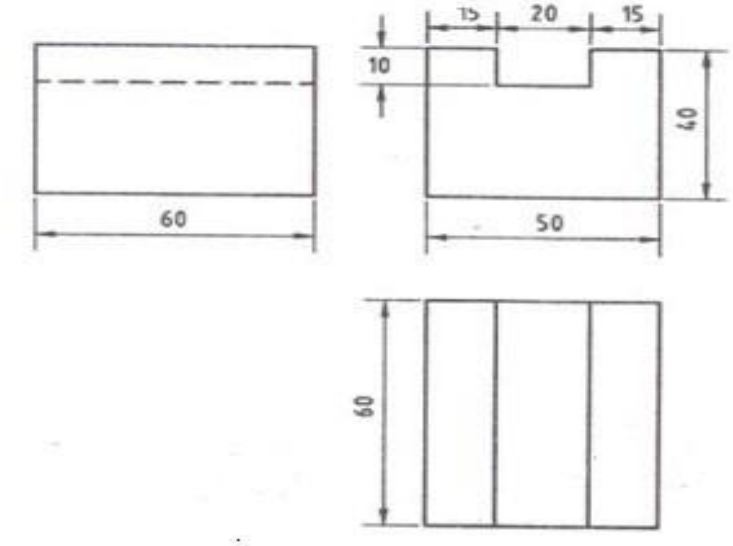
4) Draw the front view ,top view of the given object.



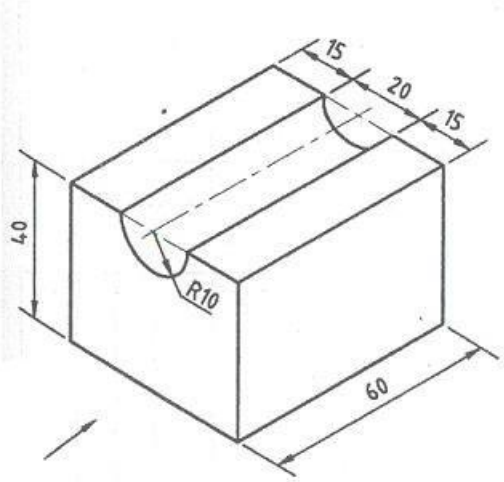


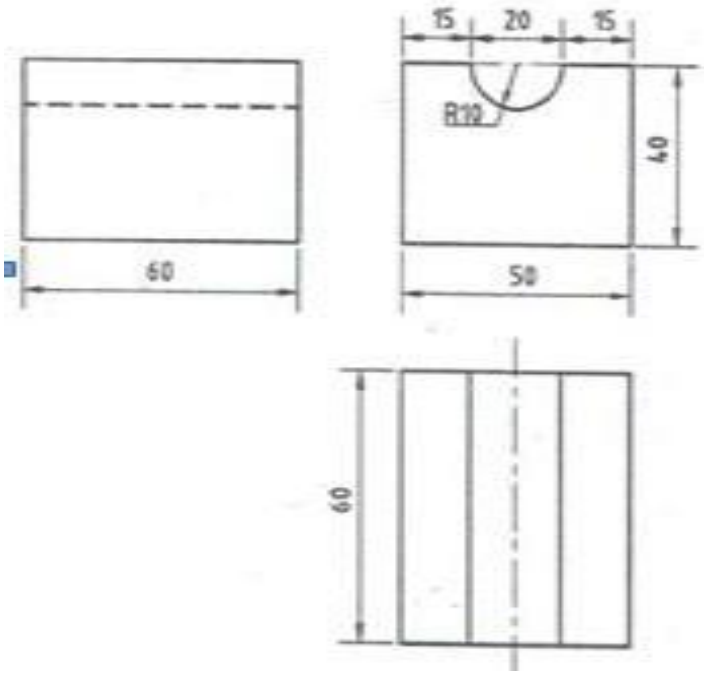
5) Draw the front view,top view and side view of the object.



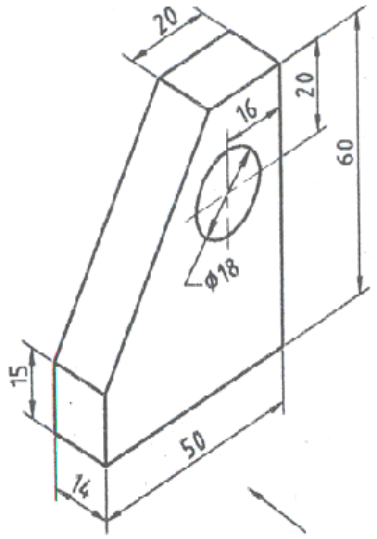


6) Draw the three views of the given object

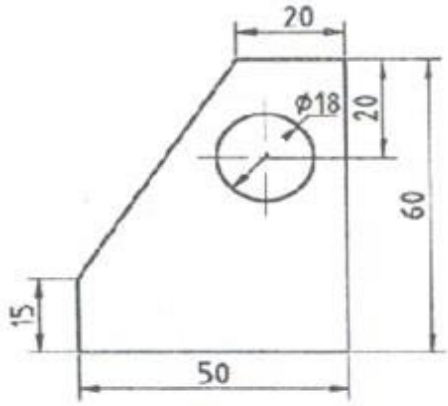




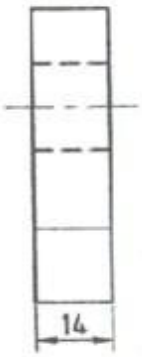
7) Draw the front view,top view and side view of the given object



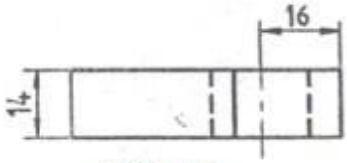
ISOMETRIC VIEW



FRONT VIEW

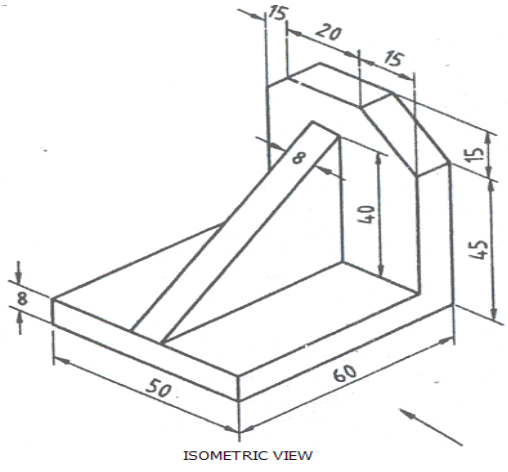


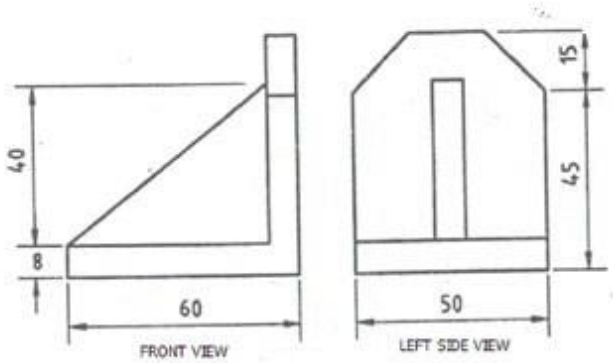
LEFT SIDE VIEW

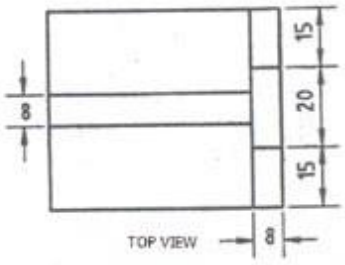


TOP VIEW

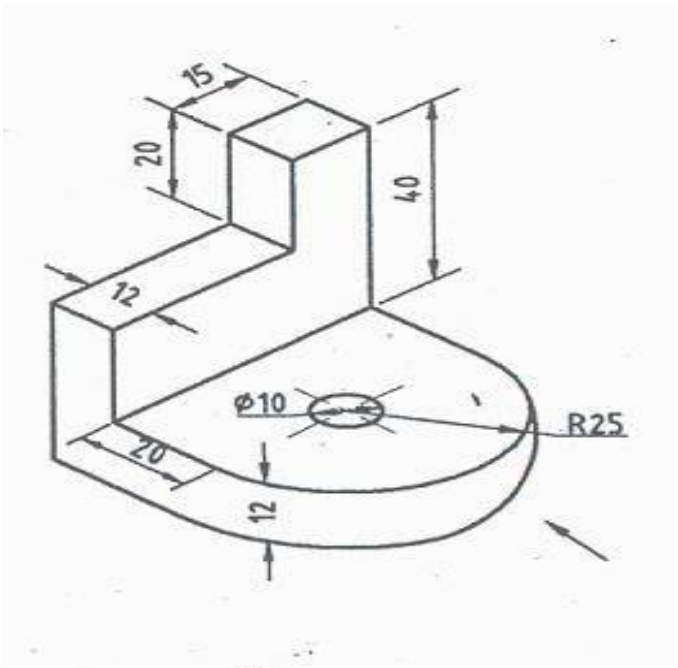
8) Draw the front view, side view and top view of the given object

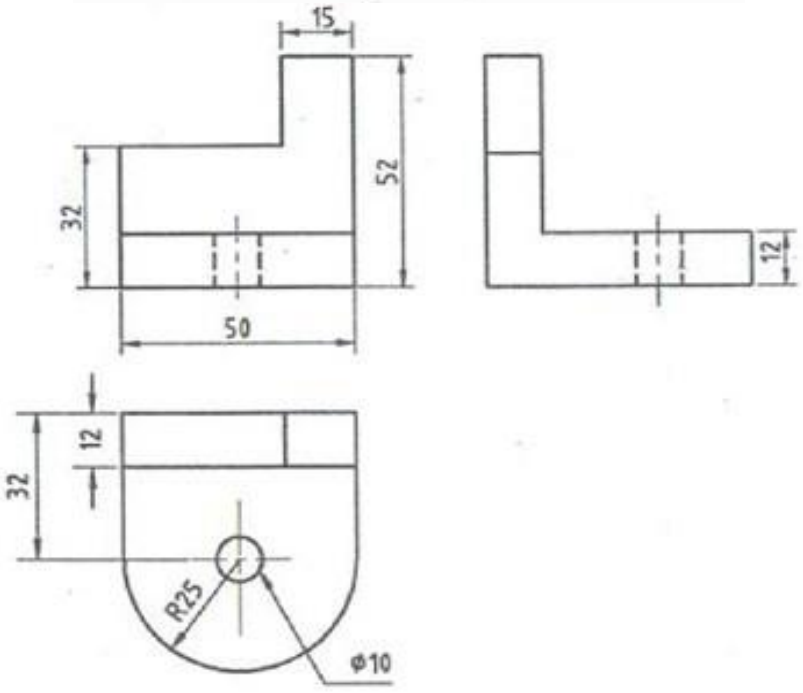




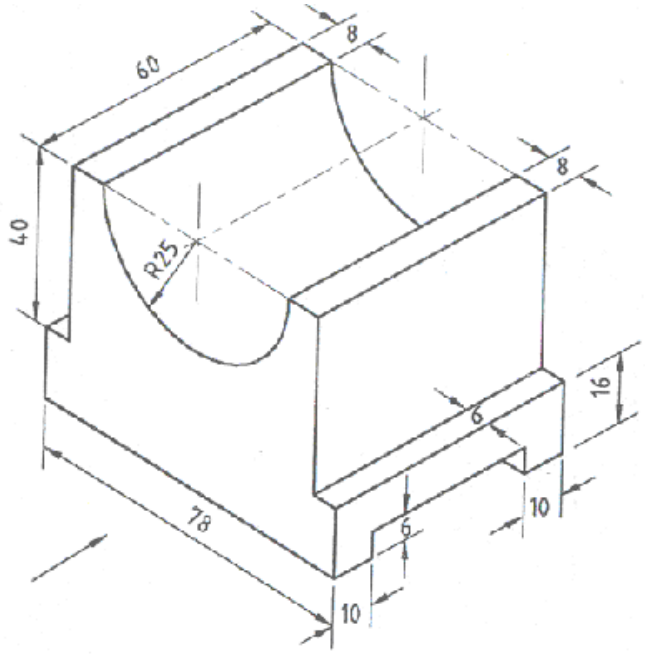


9) Draw the front view ,top view and side view of the object.

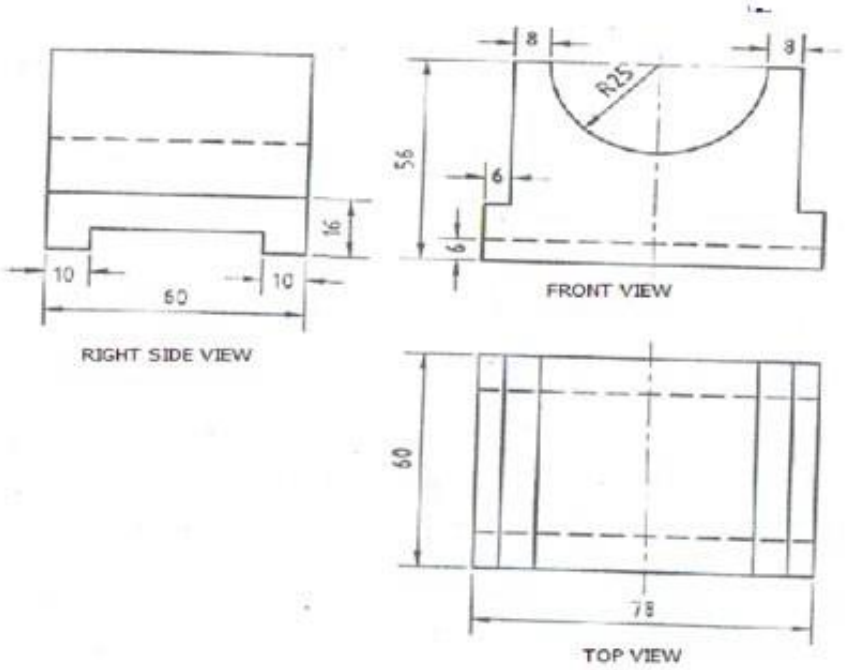




10) Draw the front view, top view and side view of the object.



ISOMETRIC VIEW



RIGHT SIDE VIEW

FRONT VIEW

TOP VIEW

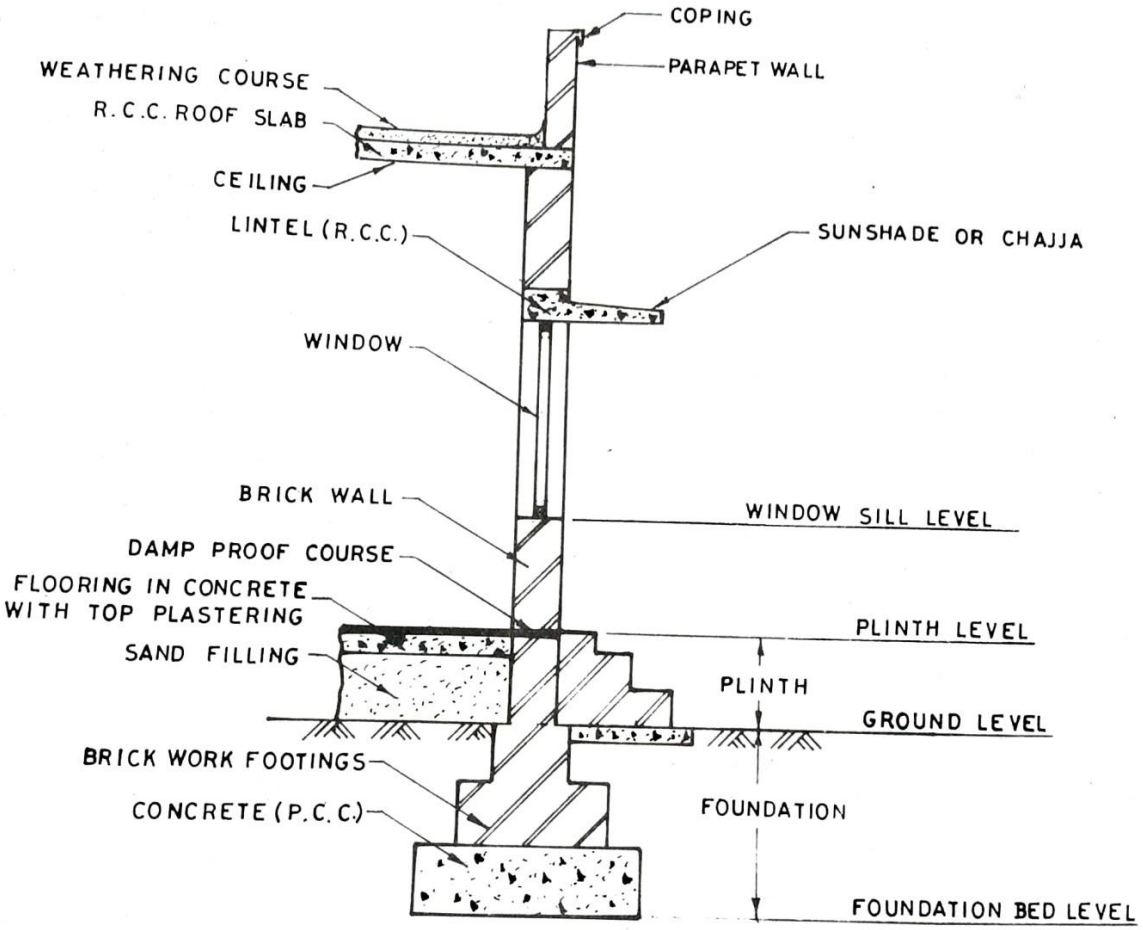
BUILDING DRAWING

A building is a living place surrounded by walls and covered by roof for the purpose of keeping out rain,sun and wind.Correct drawings save cost,labour and time in the office as well as on the site.

The main aim of building drawing is to give sufficient information by the Design Engineer to the Construction Engineer. In order to give sufficient informations about the building, the following views are drawn.

i) Top view
ii) Front view
iii) section at a particular plane

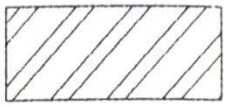
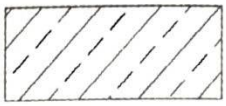
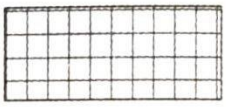
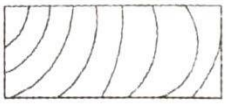
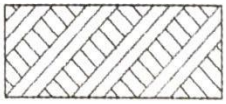
COMPONENTS OF A BUILDING



TERMINOLOGY OF BUILDING COMPONENTS

1. **Foundation or substructure:** It is the portion of the building below the groundlevel.It transmits the load coming from superstructure to the ground.
2. **Footings:** Footings are stepped courses in the foundation. It is used for purpose of distributing load of the superstructure over a larger area.
3. **Basement:** It is the lower storey of a building partly below the ground level.
4. **Superstructure:** It is the portion of the building above the ground level.
5. **Plinth:** It is the portion of the structure between ground level and floor level.
6. **Flooring:** The flooring will be generally in plain cement concrete. of about 130mm thick.
7. **Damp proof course(D.P.C):** It is a continuous layer of an impervious material provided at the plinth level beneath the walls to check dampness in the walls andto prevent moisture from getting through the foundation.
8. **Masonry walls:** Masonry walls may be either brick or stone. Parapet and partition walls may be generally of 100 mm thick.
9. **Doors,windows and ventilators:** The size of door to be adopted for a room depends basically upon the functional requirements of the room.The size and number of windows and ventilators should be sufficient to provide adequate light and ventilation in the room.
10. **Sill:** It is the bottom horizontal frame of a window or door.
11. **Lintel:** It is defined as a horizontal member placed over the openings such as door or window to support the structure above the openings.
12. **Sunshade:** It is a projection from the wall,provided above the window for the protection against the sun and rain.
13. **Roof:** It is a flat or inclined structural member provided as a cover to the building.It is used to protect the building from weathering conditions namely,rain,sun,wind etc.
14. **Ceiling:** The lower end of the roof slab exposed to the room is known as ceiling.
15. **Weathering course:** It is provided at the top of the roof slab to protect the slab from weathering action of sunshine, rain.
16. **Parapet wall:** It is a short wall built over the roof all round the building.
17. **Steps:** Steps are generally in brick work in cement mortar laid on PCC base.

Conventional representation of building materials in section

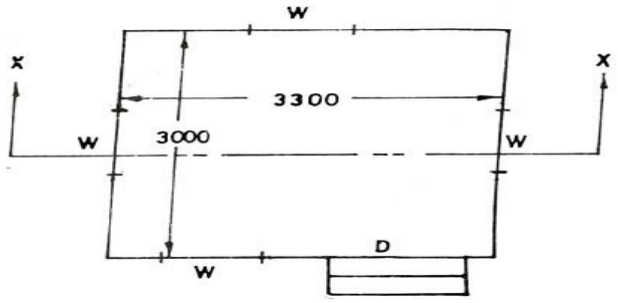
Material	Symbol
Brick	
Concrete	
Natural or reconstructed Stone	
Partition blocks	
Wood	
Earth or sand filling	
Plaster and plaster products	
Glass	
Metal sections	

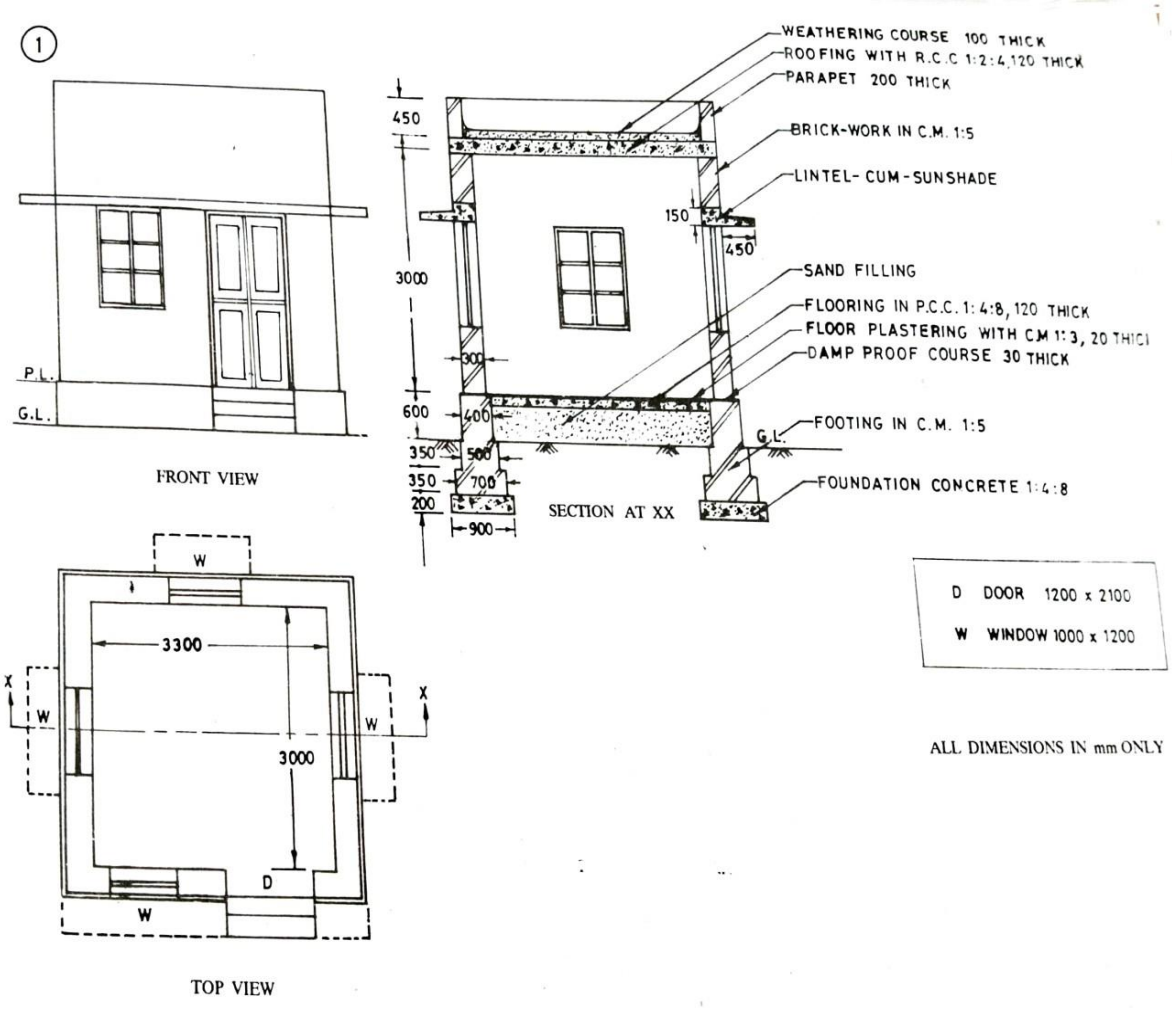
Problem: The line sketch of security shed is given.Draw to a suitable scale the following views :

i) Top view

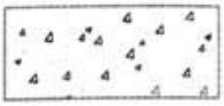
ii) Front view

iii) section at XX





Problem : Draw the conventional representation of the given building material in section i) Brick ii) Concrete iii) Natural stone

Material	Symbol
Brick	
Concrete	
Natural or reconstructed Stone	

ACAD

Cad is a computer aided software used to draw diagrams of any object in either 2D or 3D format and view their front, top, and side views. The abbreviation of CADD is Computer Aided Design and Drafting.

Applications of CADD:

CADD is used in various engineering branches like

i) Mechanical
ii) Automobile
iii) Electrical
iv) Electronics
v) Civil
vi) Architectural

Basic commands :

Line, circle, 2 point and 3 point arcs, rectangle, ellipse are some of the basic commands used in CADD.

Co-ordinate system:

Co-ordinate is based on the origin (0,0)when the X,Y values are known of the point from the origin

Types of Auto Cad modes:

Gridded, isometric, orthographic and 2D are the three modes used in auto CADD

Utility commands:

NEW, OPEN, CLOSE, SAVE, EXIT are the utility commands used in AUTO CAD.

ZOOM command:

While drawing, it is required to bring the area of our interest on to the screen. ZOOM command enlarges or reduces the view of the drawing.

O-SNAP Command:

Using O-SNAP, you can locate an exact position of an object like end point or mid point of a line, intersection of two lines, centre of the circle etc. Without knowing the co-ordinates.

Chamfer command
Chamfer is used to draw a line at the Conner between two selected lines.

Fillet command:
Fillet command is used to draw an arc joining the two adjacent lines at the Conner.
Polar tracking:
Polar tracking is switched on when angles come into concern and precision oriented angle diagrams are to be drawn

Object selection methods: There are 3 object selection methods
1) pick box method.
2) windows.
3) crossing